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TIMING ORTHODONTIC PROCEDURES

By STEPHEN C. HOPKINS, B.S., D.D.S., F.I.C.D., Washington, D. C.

TIMING is essential in all human activities. Whether it be driving a car, swinging a golf club or playing a piano, success depends on a nice attention to the coordination of the various elements involved.

Though the tempo may be slow, orthodontic procedures must be properly timed also, with the same regard to synchronizing and coordinating treatment with the growth and development of the patient. Timing must be considered in determining the most advantageous growth stage in which to institute active treatment, the logical point to allow a rest period, the phase of development best suited for certain types of movement and when the case may be completed. In fact, all successful orthodontic activities must be inextricably and inevitably bound up with an earnest desire to adapt our steps to the rhythm of natural growth. If we fall out of step, disaster will follow.

The most important decision in orthodontic activities lies in the answer to the question, "What is the best time to start treatment?" That this seems important to many appears evident in the oft-repeated query of the general practitioner, of the parent, of the pediatrician. That the answer is involved appears just as evident in the inability to give a definite reply. Dozens of reasons have been given in the abundant literature on this subject in an effort to explain the advantages of one time over another for starting treatment of the various types of malocclusion. Ideas have ranged from one extreme to another. Men have advocated immediate treatment for all abnormal conditions as soon as they become manifest. Others have seemed just as extreme in preferring to wait until adolescence. Individuals writing at different periods have indicated changing ideas and opinions. Trends at different periods are to be noted.

The Calvin Case[1] school of thought considered orthodontic treatment of deciduous teeth to be presumptuous interference. Bogue's[2] teachings, followed for years, advocated deciduous arch expansion based upon standard arch measure-

Read before Section on Orthodontia at the Eightieth Annual Session of the American Dental Association, St. Louis, Mo., October 26, 1938.

ments. In recent years, increasing clinical experience and research have added much to our knowledge, and, today, facts rather than theories are entering into the solution of this problem. It is interesting to review the literature. Kelsey,[3] with his usual acumen, probably gave the most succinct and pleasing answer to the question in 1926: "It is a rational plan to treat such abnormal conditions as are apparent when a patient comes in, and do nothing more until a need for further treatment is indicated." Would that, in our inexperience, there were no more ifs, ands and buts to the problem than this.

The English school of thought, championed by such writers as Northcroft[4] and Chapman,[5] almost invariably favors very early treatment, with little confidence in the efficacy or permanence of late treatment. Eby[6] has seemed to gradually become more conservative in regard to treatment of deciduous and transition dentitions, reflecting a general trend of many writers, including Waugh,[7] Hatfield,[8] Abram Hoffman,[9] Flesher,[10] Strang,[11] Young,[12] Duckworth,[13] Angle,[14] Lischer[15] and McCoy.[16] Delabarre,[17] Willett[18] and Charles Baker[19] have been staunch advocates of early treatment. Baker probably includes more types of cases to be treated early than most other writers. Hellman,[20] LeRoy Johnson,[21] Samuel Lewis[22] and others have given much thought to the biologic factors involved in selecting a time for starting treatment. Lewis and Lehman have probably enjoyed the most favorable opportunities for observing normal growth without appliance interference and have given us many facts to supplant theories and suppositions. Mershon, in recent years, has rather leaned toward later treatment of many conditions. Later treatment also appears to be favored by many who routinely use the more rigid types of appliances.

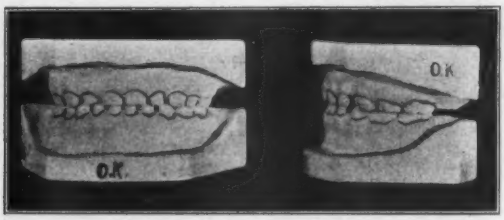

Fig. 1.—Normal dentition at 5½ years; showing developmental spacing. The distal surfaces of the second deciduous molars are in the same vertical plane.

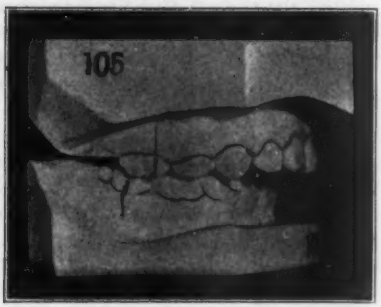

Fig. 2.—Deciduous Class II Division 1 (distoclusion) case.

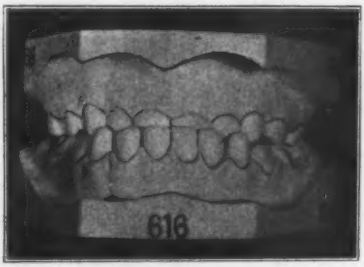

Fig. 3.—Deciduous arches of developing Class III (mesioclusion) case.

In the gradual crystallization of ideas, may we not today have some hope of approaching a general standardization in our procedure? May we not evolve some form of chart which, in a general way, might give a more or less definite answer to the puzzled orthodontist and equally puzzled general practitioner? I suggest herewith such a chart.

Fig. 4.—Profile of patient in case referred to in Figure 3.

At the outset, certain limitations must be evident. We must, of course, recognize that each case of malocclusion is an entity unto itself. It has its own characteristics and peculiarities, common to no other case of malocclusion. The general physical and mental makeup of the individual, the arrangement of teeth, the bony structure, the musculature, everything is different. Therefore, the handling of a case is individual in character. Still, each case bears certain resemblances to other cases and can, in a limited way, be placed in a classification. Again, one must realize that age is a rather indefinite factor in our considerations.

Eby has said that there is a range of difference between the chronologic and the physiologic age of every person. There is little difference at 3 and little difference at 20, but between these ages there is a great difference. We commonly see one child of 9 or 10 with all permanent teeth including the second permanent molars fully erupted. Another child may be 14 and still retain some deciduous teeth. Therefore, in the individual case, we must make allow-

Fig. 6.—Open bite case.

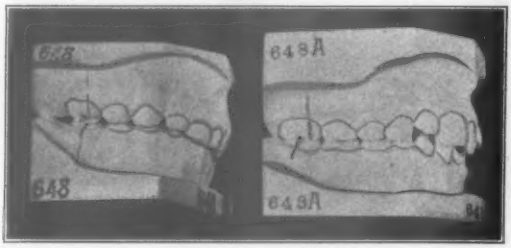

Fig. 5.—Left: Deciduous molars in nonfunctional relation. Right: Appearance of case several years after correction of molar relation by three months' treatment.

ance for individual differences. Other physical changes, such as in height, weight and bony development, are just as important as tooth eruption and ordinarily accompany it. We also must recognize that, in the light of present-day knowledge, any orthodontic procedure is an interference and is not strictly biologic. Treatment may actually do more harm than good if not properly instituted and controlled: All the more reason for studying the problem with the purpose of reducing unnecessary and harmful procedures to a minimum.

Fig. 7.—Narrow deciduous arches. Expansion to provide space for the normal eruption of permanent incisors is advocated by some operators in these cases.

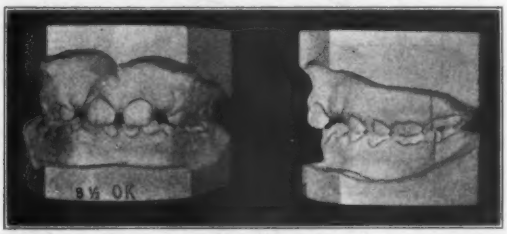

Fig. 8.—Normal occlusion at 8½ years. The maxillary central incisors are spaced. The first permanent molars are still in end-to-end relation.

We still hear, from time to time, the statement that orthodontic treatment should not be begun until the age of 12 years. At this age, all of the permanent teeth, with the exception of the third molars, are usually erupted, and if one or several or all have been affected by one or more of the numerous causes of malocclusion, their malpositions have become very definitely established. Malocclusion in general, with some exceptions, starts as a slight deviation, becoming more complicated and severe as time goes on. For many cases, waiting for 12 years of age may be similar to waiting until a small and easily controlled cavity has had plenty of time to develop and penetrate to the pulp and cause periapical disease. However, some cases may be treated too early. Certain mouths in which malocclusion appears imminent may, through the beneficial action of normal growth forces, and without orthodontic interference, develop an acceptable adult dentition. Some of these early cases which are apparently abnormal may be due to deficient early growth, which may be followed by a period of vigorous growth. Yet the movement of teeth which may be obtained by means of appliance pressure depends for its success on a reaction in the bone surrounding the teeth.

We know that young bone responds to stimuli more quickly and easily than older bone. Therefore, the younger the

patient, the easier and faster we can attain our ends. Also, the bone (and soft tissues) of the younger child can undoubtedly withstand more traumatism; and we of course realize that appliances produce this to some degree. The transition stage of dentition, somewhere between the ages of 8 and 12 years, may be considered as not too early or too late for successful orthodontic treatment. It too is beset with qualifying problems. The deciduous teeth are loose; the roots of the erupting permanent teeth have not fully calcified; the mucosa may be inflamed here and there. It is a period of rapid change which should be interfered with only with the utmost discretion. Anchorage is a problem. We should usually band the deciduous second molars only between about 4 and 8 years for resistance purposes. Usually we should not employ the first permanent molars for such purposes until the roots have fully calcified. Orthodontics is largely a problem of growth and development. This growth being intermittent rather than constant, we may seek, in some cases, to develop the arches at a time of rapid growth rather than during an inactive period. In other cases, it may appear more advisable to remove appliances during growth spurts. In any case, we must recognize a relationship between appliance therapy and natural development.

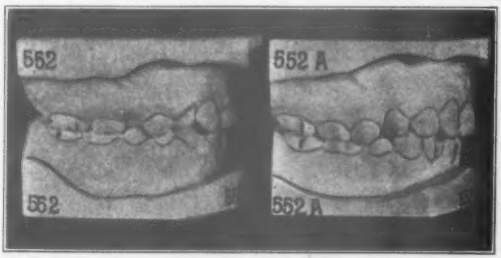

Fig. 9.—Left: Maxillary right first permanent molar in forward position. Right: Case two years after treatment.

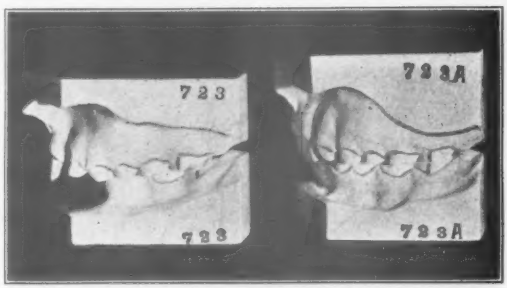

Fig. 10.—Transition Class II, Division 1 (distoclusion) case, before and after year's treatment.

Let us assume that the optimum time for treatment falls between the ages of 3 and 17 years. It is convenient and quite possible to refer most ordinary cases of malocclusion to three general groups within these limits, realizing that, in the individual child, these groups may overlap.

I. DECIDUOUS DENTITION; AGES 3 TO 7 (FIG. 1)

In the first group, we may use the deciduous second molars for banding to furnish resistance to pressure. At this age, use of the slightest possible pressure and the most delicate appliance will afford quick results. Appliances may be removed usually in a very few weeks. However, we have to make entirely new appliances if treatment must be extended into the transition stages or later, and this indicates a problem in economics as a limiting factor. Treatment of deciduous teeth does not guarantee that the permanent teeth will erupt normally. The tendency for orthodontic pressure to result in early resorption of the roots of deciduous teeth is an argument against unnecessary and prolonged appliance therapy in this period. We must exert pressure upon deciduous teeth before the roots have started natural resorption. This definitely limits the range of treatment. For many children the age of 7 is too late to move deciduous incisors. Treatment of the following cases must be early or not at all.

1. Class II, Division 1 cases, distoclusion (lower arch in posterior relation to upper with protrusion of upper anterior teeth). (Fig. 2.)

2. Class III cases, mesioclusion (lower arch anterior in relation to upper). (Figs. 3 and 4.)

Fig. 11.—Photographs of patient in case referred to in Figure 10.

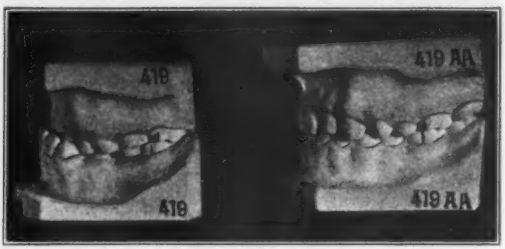

Fig. 12.—Transitional (developing) Class III (mesioclusion) case; before and after eleven months' treatment.

3. One or more teeth definitely out of functional occlusion (example: upper incisor in lingual relation to lower incisor).

4. Preventive treatment sometimes including appliance therapy (open-bite cases, thumb-sucking cases, some with extremely narrow arches, etc.). (Fig. 6.)

Treatment of certain Class II cases and all Class III cases (involving malrelation of the arches) during this period is indicated for several reasons:

1. Such conditions are progressive in character, with no chance of becoming normal.

Fig. 13.—Appearance of patient in case referred to in Figure 12, before treatment.

2. They involve arch abnormality rather than mere tooth malposition and can be treated just as well, or better, by utilizing the deciduous teeth.

3. Treatment is very much easier.

4. The permanent dentition is given a good chance to develop normally when the first permanent molars are allowed to erupt in normal occlusion.

5. Mouth breathing, abnormal musculature and defective mastication are immediately overcome and the benefits of these steps made possible early in life.

There is some argument in regard to the possibility of retaining a treated deciduous distoclusion and it is the consensus of opinion that these cases should be selected; possibly only severe cases with associated mouth breathing and abnormal musculature and deficient mandible being treated. It is generally believed that these cases never correct themselves, but grow progressively worse. Class II, Division 2 cases (distoclusion with retrusion of upper incisors) may usually be treated at later stages since they involve no severe muscular or bone deformity. Good results have been reported in treating this condition just at the time the upper deciduous incisors are loosening, thereby removing the interference which they opposed to correcting the arch relation. Deciduous teeth which are in positions of definite malfunction are corrected to allow for normal mastication during this important growth stage; also, to encourage normal arch development, believed to be dependent to some extent on normal mastication, and to aid in the normal eruption of their permanent successors.

II. TRANSITIONAL DENTITION; AGES 8½ TO 12 (FIG. 8)

In the second age group, we can begin to use the first permanent molar for anchorage purposes. We cannot call a case finished in this period, for it still presents many an opportunity to guide an erring tooth here and there, to correct the first permanent molar relation, to change the arch relation (if this has not been done in the deciduous period) and at least to start to correct protruding upper anterior teeth and to correct many other abnormal conditions:

1. The relation of the first permanent molars. (Fig. 9.)

2. Any malrelation of the arches (if not corrected in the deciduous arches). (Figs. 10-14.)

3. The position of teeth out of functional occlusion. (Fig. 15.)

4. The position of malerupting teeth, gently guiding them into position. (Fig. 16.)

unanimity of development: some cases of malocclusion grow worse; others improve; some change from one type to another. Diagnosis is difficult. These facts and others lead most authorities to recommend caution in interfering during this period. Several writers have stated that it is good practice to move teeth with uncalcified roots into their normal position, thus insuring their permanent retention as the roots develop in the final position. This is an easy and often satisfactory procedure if timed properly, but one must not attempt to force things before natural bony development has proceeded. We cannot hope to retain a tooth that is moved into its final position years before it belongs there. Throughout this period, it seems good practice to place appliances

Fig. 14.—Appearance of patient in case referred to in Figures 12-13, after treatment.

Fig. 15.—Left: Maxillary right central incisor in locked, nonfunctional occlusion. Right: Appearance several years after treatment was completed.

5. Lack of space for the normal eruption of the permanent teeth.

6. Protrusion of the incisors (to prevent further mouth-breathing and attendant malfunction of the lips and other tissues). (Fig. 17.)

In recent years, Lewis and others have given us much food for thought in regard to what happens during the transition stage. There appears to be no

for a definite end and to remove them promptly as soon as this end is attained. Slight irregularities of individual teeth not greatly interfering with function can wait until later stages. In this way, little interference with Nature's growth plan is offered.

period. There is usually no need to wait for further development. Patients are less tolerant of appliances than previously, but may cooperate more intelligently. Diagnosis is more certain, as most cases have attained their final typal characteristics. (Figs. 19-20.)

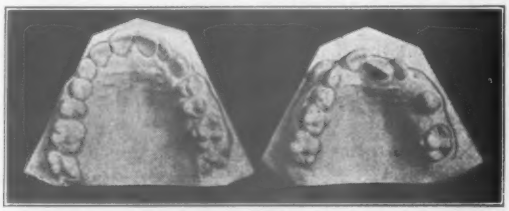

Fig. 16.—Transition denture; opening spaces and guiding malerupting teeth into position.

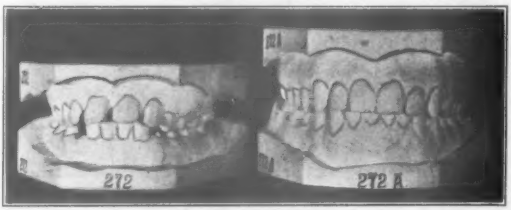

Fig. 17.—Transition denture; protruding maxillary anterior teeth moved back to overcome abnormal lip habits and mouth breathing.

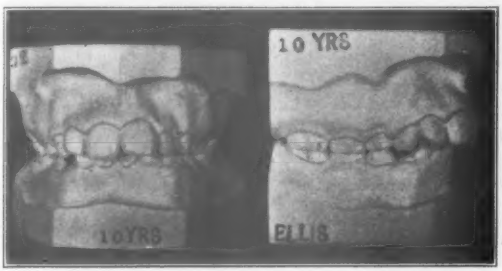

Fig. 18.—Type of transitional malocclusion that may wait until later for successful treatment. The deciduous molar and canine roots are beginning to resorb.

III. BEFORE AND AFTER ADOLESCENCE; 12 TO 17 YEARS

From 12 to 17 years, we can expect to use greater and more prolonged pressure to gain our ends. Usually, appliances must be more complex. However, cases can be started and finished at this

1. Class I, Type 1 cases have good posterior functional occlusion, but the anterior part of the arches is narrow and the anterior teeth bunched, rotated or overlapping; and perhaps there is an extreme overbite.

2. Deficient growth cases, which are

now making a belated growth spurt, will, in some instances, respond better at this time and it may even be impossible to treat them successfully earlier.

3. Cases in which it has been impossible to arrive at a definite diagnosis earlier include borderline cases, impaction of maxillary canine teeth and cases resulting from the impaction of third molars.

This should in most cases be the time for completing treatment begun in earlier stages. However, many less severe cases of malocclusion, as indicated, can very well wait for this period before interference. During adolescence and until 18 years of age, there is a period of rapid horizontal bone growth in the jaws, and cases with bone deficiency may well be started at this time. In other cases, malocclusion, as indicated above, develops late, and there is no indication for treatment earlier.

In conclusion, it is hoped that the accompanying chart will prove of benefit to those interested in a more intelligent handling of our problem. May it emphasize the fact that in many cases treatment is started too late for best results. In many, it may be started too early. In modern practice, appliances are no longer placed in all cases of malocclusion when presented. Many of them are placed under observation and changes for the better or worse noted. Appliances are used when it appears that they will do the most good in the shortest time. Simple treatment should take the place of long, complex and often doubtful procedures. We are learning more each day about growth and development. We are beginning to realize how much we do not know and

Fig. 19.—Typical Class I case treatment of which may be started most successfully in adolescence.

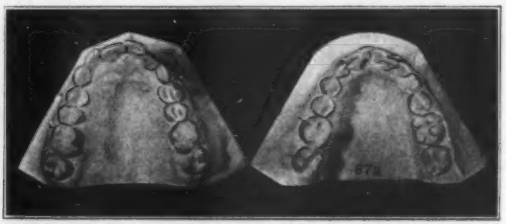

Fig. 20.—Occlusal views of case shown in Figure 19. In this case, there is satisfactory functional occlusion, but the arches are narrow and there is often a mild to severe overjet of the anterior teeth.

to tread cautiously. Untold benefits to our future patients should result.

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THE EFFECTS OF EXTERNAL APPLICATION OF THERMAL AGENTS ON EXPERIMENTALLY INDUCED INFLAMMATORY REACTIONS IN THE RABBIT*

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EXTERNALLY applied thermal agents have been used for hundreds of years in the treatment of various diseases; and many unverified opinions regarding their use have been handed down as established facts. The casual observer, therefore, may well understand why marked disagreement occurs among clinicians with regard to the treatment of an inflammatory reaction with thermal agents.

The present investigation was undertaken to study the cellular reactions within an inflamed region when its temperature is altered by externally applied thermal agents. The study was divided into two parts: (1) a determination of the alteration of muscular and subcutaneous temperature produced by external application of thermal agents, and (2) the effects of such an alteration on the cells in an experimentally induced inflammatory condition. The advice of Charles Sheard, of the Division of Biophysics of The Mayo Clinic, was obtained in the measurement of temperatures.

A complete review of the literature on inflammation is beyond the scope of this paper. Among the older outstanding works, a translation of Cohnheim's "Lectures on General Pathology"; Adami's monograph, "Inflammation; an Introduction to the Study of Pathology," and Opie's Harvey Lecture on "Inflammation" provide an excellent background for an understanding of the complex pattern of the inflammatory reaction. The reader is referred to a recent article by Menkin,[1] as well as to its bibliography, for an explanation of the various mechanisms at work in the inflammatory reaction; to Maximow's article for a comprehensive review of the literature on the cytologic changes that occur during an inflammatory reaction; to Drinker and Field's excellent monograph on "Lymphatics, Lymph and Tissue Fluid," in which many phases of the inflammatory reaction are treated with authority, and to Krogh's volume on "The Anatomy and Physiology of Capillaries."

The literature on the physiologic responses of tissue to local application of thermal agents is not extensive. Parts of Drinker and Field's monograph, as well as of Krogh's treatise, are valuable. Bazett's[2] review of the literature on the physiologic responses to heat, although it is devoted to generalized reactions, treats of localized responses at some length. Many valuable references are found in the bibliography. Bazett's[3]

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chapter in Pemberton's "Principles and Practice of Physical Therapy" and Wolf's "Textbook of Physical Therapy" are excellent for an understanding of the practical aspects of the problem.

METHOD

The inflammatory reaction has been studied through the years by two essentially different methods. One concerns itself with the microscopic observation of the responses of living tissue to irritants; the other, with examination of fixed sections of tissue from a series of animals studied at increasing intervals of time between the onset of the inflammatory reaction and the time of biopsy or necropsy. By using the first method, it is possible to observe the dynamic phases of inflammation; by using the second, the static phases. The second method, of course, reflects the dynamic changes that occur, and this is the method used in this investigation.

The inflammatory reaction was induced by the injection of 0.5 cc. of an irritant which was either a 24-hour broth suspension of *Staphylococcus aureus* or a 5 per cent solution of aleuronat. Rabbits were used for the study. The irritant was injected into the vastus lateralis muscle of both the right and the left leg, midway between the hip and knee joint. At this point, the vastus lateralis muscle forms most of the muscular bulk of the anterior femoral group of muscles (Fig. 1). Immediately after injection of the irritant, localized external thermal applications were made to one leg, the other leg serving as a control. A series of lesions was studied eight, twenty-four, forty-eight and seventy-two hours and five days after initiation of the inflammatory reactions.

The temperature was altered for eight consecutive hours out of each twenty-four hours which elapsed between the onset of the inflammatory reaction and the time of biopsy or necropsy. The temperature was modified in three ways*: (1) by application of heat to both the lateral and the medial surfaces of the anterior femoral group of muscles; (2) by application of cold to both surfaces, and (3) by application of heat to the lateral surface and cold to the medial surface.

Alterations in tissue temperature were

*The thermal agents were applied with applicators. The heating applicator consisted of a small heating unit, approximately 1.2 by 2.2 cm. A curved copper plate was fixed to the surface of the unit that came in contact with the tissue. A thermocouple made of copper and constantine was soldered to the back of the copper plate. This made possible an accurate way of observing the modifying temperatures. The heating unit was placed in a potentiometer circuit supplied by a small transformer. Variations of the potentiometer made variations in temperature possible. Two units of this type were constructed.

The cooling applicator consisted of a hollow copper chamber, 1.2 by 2.2 by 0.6 cm., through which ice water was allowed to flow. A curved copper plate was fixed to the surface of the cooling applicator, which came in contact with the tissue. A thermocouple was soldered to the copper plate, so that observations of applied temperature might be made. Two such units were constructed.

Both the heating and the cooling units were constructed so that they could be mounted in a clamp. Adjustment of this clamp varied the distance between the surfaces of the applicators that came in contact with the tissue. This enabled good contact to be made.

A constant-temperature thermocouple circuit was used, each side of which had a resistance of 5.3 ohms. A Weston model 440 galvanometer, the accuracy of which at full scale deflection varied less than $\pm$ 1.5 per cent, was placed in the copper lead of the copper-constantine circuit. With the constant-temperature thermocouple kept at 25° C., and with the resistance of the component circuits mentioned above, one scale division on the galvanometer equaled 1 degree. Each thermocouple was calibrated against a known standard. Since three tissue thermocouples and two applicator thermocouples were used in every experiment, a copper-constantine switch was constructed so that the temperature of each of the five thermocouples could be quickly and conveniently measured by suitable adjustment of the switch.

measured by thermocouples inserted in hypodermic needles. Three such tissue-temperature measuring units were used in each experiment, so that the temperature of the subcutaneous tissue on each side of the anterior femoral group of muscles, as well as the temperature in the geometric center of the muscles, was determined and recorded.

The rectal temperature was measured by a mercury thermometer, and total erythrocyte counts and differential leukocyte counts were made daily.

At the termination of each experiment, the animal was killed, the anterior femoral group of muscles were removed *in toto* and were fixed in a solution of 10 per cent formalin for one week. The muscles were then sectioned and slides were prepared for microscopic examination. Hematoxylin and eosin, Mallory-Heidenhain stain for connective tissue and Gram's stain were used.

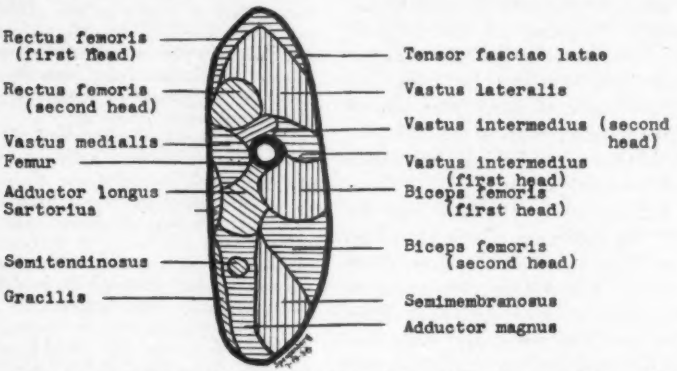

Fig. 1.—Cross-section of lateral aspect of rabbit's leg, midway between hip and knee joints. (Actual size.)

RESULTS

a. *Effects of External Application of Thermal Agents.*—After the hair was removed from the skin over the anterior femoral group of muscles, the temperature of the subcutaneous tissue was found to vary from 30 to 35° C. These subcutaneous temperatures were approximately 2 degrees less than the temperature of the same region would have been if the hair had not been removed. The temperature in the geometric center of this group of muscles was approximately 1 degree higher than that of the subcutaneous tissue in both the shaved and the unshaved skin. The temperature obtaining in these regions when the skin was shaved is called the "control temperature" throughout this paper.

Applications of heat varying between 43 and 45° C. on both the medial and the lateral surfaces of these muscles, midway between the hip and knee joints, caused the temperatures of the subcutaneous tissues on both the lateral and the medial sides to increase from the control temperature to values between 41.5 and 43.2° C. This occurred approximately six minutes after the application of heat of such modifying temperatures. The temperature in the geometric center of the muscle increased to a value between 40 and 41° C. in approximately thirty minutes. When the applicators were removed, the subcutaneous tissue temperature dropped rapidly and assumed the control value in approximately thirty minutes. The muscular

temperature dropped much more slowly.

The rectal temperature decreased approximately 1.5 degrees from the initial value, which varied between 39.7 and 37.6° C. and averaged 38.5° C. for apparently healthy animals.

Applications of cold varying between 1 and 5° C. on both the lateral and the medial surfaces of the anterior femoral group of muscles caused the temperature of the subcutaneous tissue to decrease to a value between 8 and 15° C. in approximately eight minutes. The muscle temperature dropped to a value approximately 7 degrees higher than that of the subcutaneous tissue in slightly more than thirty minutes. The subcutaneous and muscular tissue temperatures rose rapidly and approximated the control values in slightly more than thirty minutes when the applicators were removed. The rectal temperatures decreased approximately 2.5 degrees from the initial value.

A definite gradient of temperature was induced in the tissue when a temperature varying between 43 and 45° C. was applied to the lateral side of the anterior femoral group of muscles and a temperature varying between 1 and 5° C. was applied to the medial side. The temperature of the subcutaneous tissue on the lateral side rose to approximately 40° C., and the temperature of the subcutaneous tissue on the medial side decreased to approximately 12° C. The temperature of the middle of the anterior femoral group of muscles was approximately 25° C. This was midway between the temperatures of the subcutaneous tissue on each side of the muscle. The alteration in the subcutaneous temperatures occurred in approximately six minutes, and in the muscular temperature, in approximately thirty minutes. The subcutaneous temperature rapidly approached control values upon removal of the externally applied thermal agents. The subcutaneous tissue on the lateral side assumed the temperature of the muscle, whereas the temperature of the subcutaneous tissue on the medial side assumed a value somewhat higher than that of the muscle.

The rectal temperature dropped approximately 1.5 degrees (C) from the control value.

b. *Results of Injection of Irritants.*—The injection of aleuronat and staphylococci produced infarcts in the anterior femoral group of muscles of rabbits; whereas injection of the same irritants into the subcutaneous tissue produced abscesses. It was necessary to study the lesion in the muscle so that the effects of the temperature gradients through the tissue might be learned. This would not have been possible if subcutaneous tissue had been used. Therefore, this report concerns the effects of external application of thermal agents on the reaction which occurred about a region of infarction caused by the injection of either aleuronat or a broth suspension of *Staphylococcus aureus.*

The cytologic changes that occurred in the zone of reaction in the control leg were those which characterize acute inflammation. There was an infiltration of pseudo-eosinophilic leukocytes around the zone of infarction in tissues which had been injected with an irritant eight hours previously. Many of the infiltrating cells were intact; others were ruptured, discharging their granules into the tissue spaces. There was considerable edema, and a reticulum of fibrin was found in many places throughout the region. The capillaries peripheral to the region of infarction were dilated and filled with many erythrocytes and leukocytes.

At twenty-four hours, there was a notable decrease in the number of pseudo-eosinophils. Granules were rarely encountered in the tissue spaces. There were many necrotic nuclei. More fibrin was evident and the lymphatic capillaries were thrombosed by a reticulum of fibrin,

in the interstices of which were some lymphocytes. A few lymphocytes were encountered at the periphery of the zone of reaction. They were not, however, present in large numbers.

Pseudo-eosinophils were not present in the zone of reaction at forty-eight hours. There were many necrotic nuclei, which probably constituted all that remained of the pseudo-eosinophils. Yet pseudo-eosinophils as well as lymphocytes were found in the muscle tissue peripheral to the zone of reaction. The amount of fibrin appeared to be unchanged when it was compared with the amount of fibrin characterizing the twenty-four hour lesion.

The nuclei in the cellular infiltration around the infarcts were even more necrotic at seventy-two hours. At the periphery of the cellular infiltration, clumps of lymphocytes and histiocytes were observed. In the tissue in the region of infarction, there was considerable evidence of degeneration. There were large regions of liquefaction necrosis in most of the muscle bundles. The nuclei of the endomysia, as well as the nuclei of the muscle, took the stain very poorly. There did not seem to be any evidence of invasion of the region of infarction by pseudo-eosinophils, lymphocytes or histiocytes.

Essentially the same picture that had been observed at seventy-two hours obtained at five days. At the latter period, there were many necrotic cells in the region of reaction. There did, however, appear to be some invasion of the region with cells that were probably histiocytes. A few giant cells of the Langhans type were found at the periphery of the region of reaction. The amount of edema was notably less than that obtaining at twenty-four hours.

Staphylococci were found in strings scattered along the fibers of the endomysium in the 24, 48 and 72 hour lesions that were initiated with staphylococci. Many bacteria were found to be phagocytosed when they approached the cellular region of reaction. Bacteria were not found peripheral to the region of reaction in the tissues that were examined.

c. *Effects of External Application of Thermal Agents on Experimentally Induced Inflammation.*—The lesions in the muscle subjected to external thermal applications were contrasted with the lesions in the opposite leg of the same animal, which served as control. No significant alterations could be detected in the lesions the temperature of which had been elevated to a value of between 40 and 41° C. when compared with the lesions serving as controls. The gross appearance of the lesions induced by injection of aleuronat, after five days, are shown in Figure 2.

There appeared to be neither increase nor decrease in the number of pseudo-eosinophils, nor any difference in their appearance in the lesions examined eight hours after injection of the irritant. When contrasted with the control lesion, there did not seem to be any increase in the amount of edema.

There was no quantitative or qualitative difference in the cytologic picture in the 24, 48 and 72 hour lesions. There was apparently no increase in the number of bacteria that were phagocytosed, in spite of the fact that the temperature had been elevated about 8 degrees above its usual value. In none of the lesions did there seem to be any increase in edema in the lesion subjected to external thermal agents when compared with the lesion that served as a control. The amount of fibrin did not seem to be altered. In the 72 hour lesion the temperature of which had been raised, there appeared to be more liquefaction in the zone of infarction than in the lesion of the opposite leg acting as a control. This was the only experiment in which any difference was found to exist between the lesion the temperature of which was altered and

the lesion acting as a control. No such change was encountered in the 8, 24 and 48 hour and 5 day lesions.

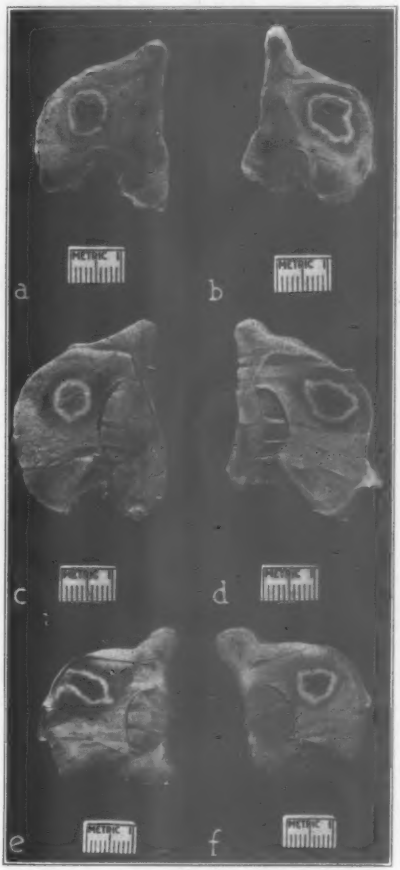

Fig. 2.—Macroscopic unstained lesions of vastus lateralis muscle of rabbits, five days after injection of aleuronat into this muscle. a, results of application of heat to medial and lateral aspects of the leg. b, control—opposite leg of a. c, results of application of cold to medial and lateral aspects of rabbit's leg. d, control—opposite leg of animal in c. e, results of application of heat to lateral aspect, and of cold to medial aspect, of rabbit's leg. f, control—opposite leg of animal in e. The appearance in color patterns of these unstained lesions is apparently not the result of the experimental conditions imposed on the subjects.

No apparent differences were observed in any of the series when the lesion the temperature of which had been reduced to approximately 15° C. was contrasted with the lesion serving as a control. There seemed to be, quantitatively as well as qualitatively, the same cytologic response in spite of marked reduction of temperature. The extent of cellular infiltration of the lesions to which either heat or cold had been applied for five days is shown in Figure 3. There seemed to be no reduction in the amount of edema, hemorrhage, fibrin formation, lymphatic thromboses or the number of bacteria phagocytosed.

A definite gradient in temperature was observed when heat was applied to one side and cold to the other; but in spite of this definite gradient, there was no apparent gradient in the cytologic reaction. There was no gradient in the amount of edema, fibrin formation or number or type of cells which participated in the reaction.

d. *Hematologic Studies.*—Great variation existed in the total number of leukocytes in the peripheral blood obtained from the marginal ear vein of normal rabbits, although no experimental procedures had been instituted. Experimental procedures previously described, however, did not cause any significant changes. Differential blood cell counts were more constant, but, even in this, the percentages of the various cell types in normal animals varied as much as ± 5 per cent. After experimental procedures had been initiated, there was a significant increase in the number of pseudoeosinophils at the expense of the lymphocytes. Occasional immature forms were found in the peripheral blood of normal rabbits as well as in the peripheral blood of rabbits that had been subjected to experimental procedure.

COMMENT

The variation of normal rectal temper-

atures of rabbits closely approximate those observed by Selden, Macleod and associates[4] and Swanson and associates. Selden believes that rectal temperatures may vary as greatly as oral temperatures. Fecal material in the rectum may interfere with accurate measurement of temperature. It was found during the present investigation that if the thermometer were removed from the rectum and cleansed of the adherent fecal material, the rectal temperature upon reinsertion would be as much as 0.5 degrees (C.) higher than before.

The decrease in rectal temperature which was observed may be explained by the fact that hair was shaved from the abdomen as well as from the legs.

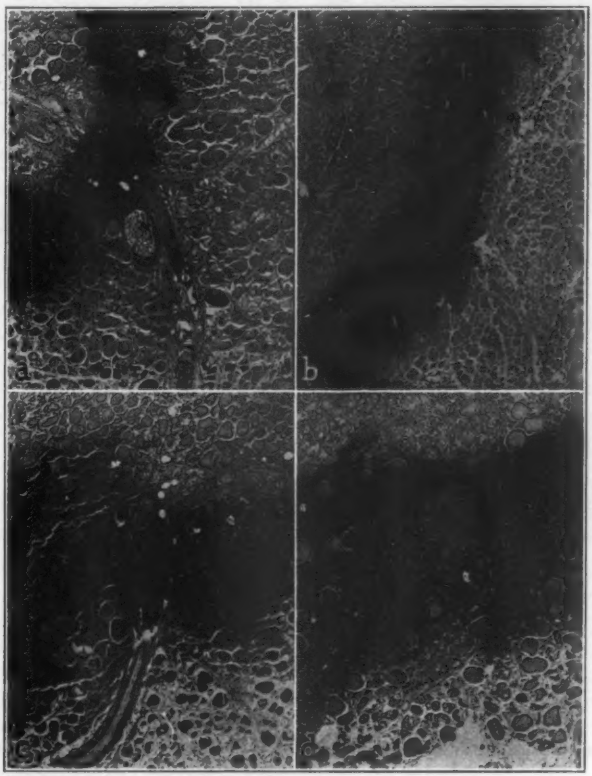

Fig. 3.—Microscopic appearance of lesions of vastus lateralis muscle of rabbits, five days after injection of aleuronat into this muscle. a, section of lesion to which heat had been applied for eight hours of each twenty-four hour period for five days. (Hematoxylin and eosin; ×50.) b, section of lesion appearing in control leg (opposite leg) of animal in a. (Hematoxylin and eosin; ×50.) c, section of lesion to which cold had been applied for eight hours of each twenty-four hour period for five days. (Hematoxylin and eosin; ×50.) d, section of lesion appearing in control leg (opposite leg) of animal in c. Although there are differences in the width of the infiltrating cellular regions of these four sections, a survey of the sections of the entire lesion reveals no significant differences in the extent of the cellular reaction as referable to the experimental conditions imposed on the subject.

The abdominal region was protected from loss of heat in a crouching position, but when the animal was placed upon its back, the region was exposed to the air without protection of any kind. It would seem that this was more responsible for the decrease in rectal temperature than was the local alteration of temperatures resulting from experimental procedures.

The number of degrees in temperature that a tissue may be elevated or lowered is dependent on the ability of the tissue to tolerate the modifying temperature. There are limits, therefore, above which the temperature of the tissue cannot be altered without physically damaging the tissue. This limit in the rabbit was found to vary between 43 and 45° C. Since the control muscular temperature varied between 30 and 35° C., it was possible to cause only small increases in temperature of the tissues as compared with the decrease, provided, of course, the tissue was uninjured.

The actual temperature of the tissue probably differed from the observed temperature of the tissue, inasmuch as the actual temperature was modified by the radiation of heat to and from the hub of the hypodermic needle in which the thermocouple was mounted. It was further modified by conduction of heat along the shaft of the needle to and from the thermocouple. The first named modifying factor was limited as much as possible by wrapping the hub in cotton. There is no method that can be used to circumvent the second named modifying factor.

The measurement of the elevation or decrease of temperature produced in the tissues by external application of thermal agents depends on the placement of the thermocouple in the tissue. Movement of the needle through the tissue will cause a variation of the recorded temperature. It was found that slight movement was capable of changing the value several degrees. Therefore, small differences in temperature are not significant, since it was impossible to prevent slight movement of the thermocouple in the tissue.

Local external application of heat on both sides of the anterior femoral group of muscles caused the subcutaneous temperature to be elevated to a value approximately 2 degrees less than the applied temperatures; whereas if application was made to but one side, the subcutaneous temperature was elevated to a value approximately 4 degrees less than the applied temperature. The difference observed in this study between the temperatures of the subcutaneous tissue and the applicator when heat was applied to but one side of the muscle was somewhat less than that observed by Macleod and associates.[4, 5] This slight discrepancy is probably explained by differences in the physical apparatus and the placement of thermocouples in the applicators.

The rapid return of the subcutaneous temperature to control values following removal of external thermal agents seems to indicate to some extent the effectiveness of the vascular system in its reaction to instantaneous changes in temperatures of the tissues. If there is continued application of heat, there is an unlimited supply of calories, and if cold is applied, there is a limited supply of calories. The blood stream, particularly in the muscle, seems to be rather efficient in coping with the altered environmental temperature for approximately a half hour. After that time, the blood stream apparently is of little value in maintaining the control temperature. It is probable that an equilibrium is reached between the attempt of the vascular system to maintain a constant control temperature and the modification of it by the external thermal agent, provided the constant modifying temperature is applied for more than half an hour. The temperature of the tissue

is probably dependent on actual conduction of the modifying heat through it, rather than on the reaction of the capillary bed in attempting to maintain the control temperature. This view was held by Macleod and associates.[5]

It is difficult to explain why subcutaneous injection of an irritant produced abscesses; whereas intramuscular injections of the same irritant produced infarcts. Pressure resulting from the injection may be a factor in the production of muscular infarcts, yet when 0.25 cc. of a broth suspension of *Staphylococcus aureus* or aleuronat was injected, an infarct resulted. The only difference observed was that this muscular infarct was smaller than those produced by the injection of 0.5 cc. of the same materials. Further attempt to rule out pressure as a factor in the production of abscesses was made by injecting 1.0 cc. of sterile broth. In microscopic study of the injected region, hemorrhage was noted; but there was no infarction to be seen. External pressure exerted by the applicators was not a factor, inasmuch as infarcts were also produced in muscles that were not subjected to such pressure. The unnatural position of the animal was not responsible for this reaction, because infarcts were found even after the animal had been allowed to run about freely in its cage after the intramuscular injection of either aleuronat or staphylococci.

It seems that the reaction, previously described, of muscle tissue to the injection of irritants, either bacterial or chemical, is typical. It is realized that injection of intensely irritating substances is capable of causing thrombosis, as was pointed out by Silberberg; yet thrombosis was not the first reaction of the capillaries of the subcutaneous tissue in the study under consideration. This might well lead to speculation on the inherent differences that may exist between the capillaries of the muscle and those of the subcutaneous tissue. There may also be a difference in the physiologic nature of the substances produced by the action of the irritants on the muscular and subcutaneous tissues, the substance produced in the subcutaneous tissue being similar to that described by Menkin[6, 7] and the substance produced in the muscular tissue being much different. Then too, the irritant may diffuse more rapidly through the muscular than through the subcutaneous tissues. This diffusion may enable the irritant to come in contact with a greater number of capillaries in the muscular tissue as compared to those of the subcutaneous tissue, with the result that massive infarcts are formed in the former, but only small and unnoticeable infarcts in the latter. The infarct was the most notable lesion in the muscle, and the inflammatory reaction, the most notable one in the subcutaneous tissue. Further investigation is indicated in this field.

Even though it was demonstrated that the muscular temperature of one leg had been altered by external thermal applications, no alteration in the cytologic response of the lesion could be observed on comparison with the lesion in the other leg of the same animal serving as a control. These results were not the ones anticipated; for, in the light of *in vitro* studies of certain phases of the problem,[8, 9] it was believed that a difference would occur as a result of alteration of temperature.

Since many phases of the inflammatory process are the result of chemical reactions,[1, 6, 7] and since heat is known to increase the speed of a chemical reaction, it is difficult to explain why alterations of temperature caused no change in the inflammatory process during the study under consideration. Van't Hoff's rule states that the velocity of a chemical reaction is increased twofold or more for each rise of 10 degrees C. in the temperature of the reaction. However, the rule

may be modified by several factors. The first of these is that there be sufficient reagents to continue the reaction, and the second, that the end products be removed so that the reaction may not be hampered. If these conditions are not met, the reaction will either cease or be modified. This rule has been applied to biologic problems and has been found to govern many of them.[10]

It may be postulated, then, that changes were not observed in the lesions subjected to alteration of temperature because the modifying factors of the law were not satisfied. That is, the decomposition products were not adequately removed, and therefore remained to prevent the reaction from continuing.

The fact that the lesion was unchanged by cold applications becomes important, inasmuch as it is usually assumed that cold definitely lessens an inflammatory reaction, particularly the part that phagocytosis and the action of antibodies play. Of course, only the more nearly permanent changes resulting from the irritation of living tissue could be observed by the method used in this study. It is possible that differences in dynamic changes may exist between the reactions in the lesion serving as control and the reactions of the lesion the temperature of which was altered. If such differences did exist, however, it seems that they should be reflected in the more nearly permanent changes which could be observed by the method used in this study. No significant modification of the reaction could be found.

SUMMARY AND CONCLUSIONS

Lesions the temperature of which was altered, as well as those serving as controls, were studied at intervals of eight hours, twenty-four hours, forty-eight hours, seventy-two hours and five days after injection of the irritants. Comparisons were made in each animal between the lesion the temperature of which was modified and the lesion serving as a control. The temperature was altered eight hours out of each twenty-four, for the duration of each of the experiments.

From a survey of the data obtained, the following conclusions seem warranted:

1. In a series of seventy muscular lesions studied, thirty-eight were the result of injection of staphylococci and thirty-two of the injection of aleuronat. Infarcts occurred in sixty-eight of the muscles, and abscesses in two.

2. The typical reaction of rabbit striated muscular tissue to injection of either *Staphylococcus aureus* or aleuronat appears to be the formation of an infarct. Injection of the same irritants subcutaneously produced typical abscesses.

3. By application of external thermal agents to the anterior femoral group of muscles of rabbits, it is possible to alter the subcutaneous and muscular temperatures. Greater changes in temperature of the tissue are produced by cold applications than by hot applications.

4. No essential changes were revealed by the comparison of the cytologic response to the injection of staphylococci and aleuronat in the vastus lateralis muscle of one leg serving as a control with the response in the muscle of the other leg, the temperature of which was altered by external thermal agents.

5. In the same animal, there appeared to be no difference in the amount of edema or in the amount of fibrin in the muscular tissue of the leg in which the temperature had been altered and in the muscular tissue in the other leg serving as a control.

6. In spite of a definite gradient of temperature through the muscular tissue in response to hot applications on one side and cold applications on the other, no gradient was found to exist in the cytologic response.

7. There appeared to be no increase or decrease in the number of bacteria

phagocytosed in either of the lesions in which the temperature had been elevated or in those in which the temperature had been decreased.

8. There was no increase or decrease in the incidence of thrombosed arterioles, capillaries, venules or lymphatic capillaries in the lesions in which the temperature had been altered by application of external thermal agents as compared with the lesions acting as controls.

9. Leukocyte counts varied so greatly that they were considered to be of little value. Only slight significance was attached to the occurrence of small alterations in the percentage of the various types of cells present in the peripheral blood.

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SIGNIFICANCE OF EARLY DENTAL CARIES

By E. E. Starr, B.S., D.M.D., Portland, Ore.

EARLY dental caries, especially in the first permanent molar, is of particular interest because of its prevalence and the adverse conditions brought on by its ravages. This fact is as old as dental literature, yet the profession as a whole seems to view the entire situation lightly and to take the frequent premature loss of this tooth as a matter of course and as practically unavoidable. We realize the futility of attempting the impossible, but we should take advantage of the opportunity to begin curative or at least protective treatment as soon as possible. The mouth and teeth frequently furnish evidence of systemic malconditions, and, as the dentist is often the first to see these cases professionally, his obligations are very great. It is difficult to consider any dental aberration as anything but a symptom. Thus, the development of dental caries, although having certain peculiarities of a local nature, seems to be largely dependent on metabolic dysfunction or dietary discrepancy for its existence, and therefore often signifies general abnormal conditions.

Every tooth should erupt perfectly formed, without defects, and resistant to decay, but the significant fact is that exceptions to this are so common that newly erupted, nearly perfect teeth excite extreme admiration, and slight imperfections are frequently ignored. The first permanent molar is especially prone to come into position with many structural defects which predispose it to early destruction.

This tooth is formed and erupted at a time when the child is rapidly developing and when there is an extreme demand for those materials which enter into tooth structure. The earliest phase of the development of the first permanent molar is dependent on the mother and is extended over into early childhood, when the nutritional intake is changing and difficult to control. Thus it seems that peculiar influences often combine to produce a tooth whose lobes are ill-united and whose hard tissues may be faulty. The enamel of an erupted tooth is not changed by metabolic body processes and remains as an index of conditions existent at the time of its formation.

All surface defects are areas of vulnerability to dental caries, and most of them are the effects of some deficiency during the formative period. It may be that whatever caused a first molar deficiency was overcome in time to save the other teeth, but, in any event, it does suggest an early weakness with the possibility of recurrence. In the study of local conditions which would probably help to account for the frequent and rapid disintegration of the first permanent molar while other teeth in the same arch remained comparatively immune, we became interested in determining whether deep penetration of these visible surface defects is common. Personal visualization of this penetration was necessary to our enthusiastic teaching and practice of operative procedures where caries could not be clearly demonstrated. Our findings only verify the ob-

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servations of those who have studied ground sections that when a small sharp explorer will catch in deep first molar fissures, the lack of enamel union is nearly always traceable to the dentin and is sometimes superimposed upon defective areas of dentin.

In some instances, where the enamel was united near the dentino-enamel junction, the enamel showed poor union; that is, lines having the appearance of enamel lamellae extended from the bottom of the fissure to the dentin.

Decay in an area of that kind would have an ideal road for rapid and destructive advance to the dentin. Another point to be stressed is that very soon after, and sometimes before, decay reaches the dentin, the pulp is affected, as is indicated by the frequency of deposits of secondary dentin. Explorable

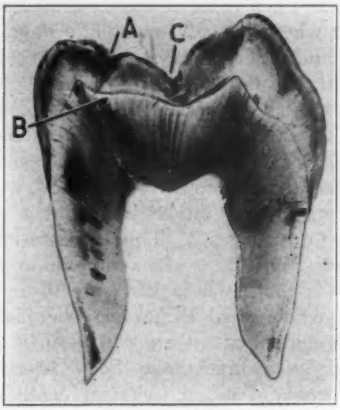

Fig. 1.—Unerupted molar. A, enamel defect extending to B, uncalcified area in dentin. C, ill-formed groove over irregular enamel.

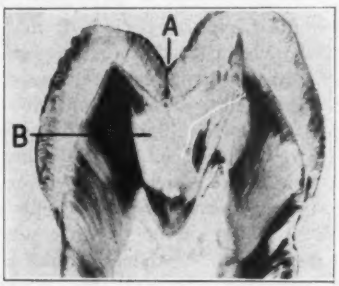

Fig. 2.—Bicuspid with deep groove A, from which lamella reaches dentin B, transparent zone.

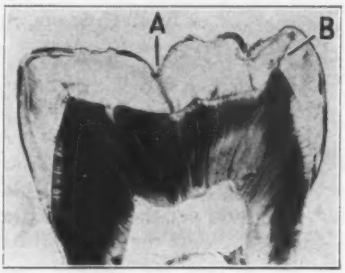

Fig. 3.—A, lack of enamel union from groove to dentin. B, lamella from point of cusp to dentin. The surface irregularity barely engaged a fine explorer.

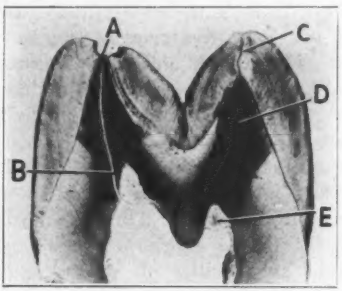

Fig. 4.—A, decay in point of cusp. B, fracture caused in mounting. C, lamella from small rough spot on cusp. D, affected dentin. E, secondary dentin.

Fig. 5.—Teeth of 11-year-old boy.

caries predicates dentin involvement and pulp excitement. Logical thinking decides that prophylactic odontotomy is indicated in all deep pits and fissures in newly erupted first molars. If a person has been lucky enough to reach adult life with no decay, there may be some justification in leaving these defects alone, but taking such chances in a child has very little defense.

Another area of beginning caries concerning which there is comparatively little in the literature, has attracted our interest; i.e., the small deep cavities that are sometimes found on the points of cusps, where it is unusual for decay to begin. It is generally common with these cavities that their surface areas are small and their penetration is deep. The few I have examined show a lack of union of the enamel rods from the point of the cusp to the dentin, and, in most cases, there was evidence of irritation causing the pulp to lay down secondary dentin. The cause of this weakness cannot be easily decided, since it presents many possibilities, among which may be injuries to the enamel organ at the time of beginning calcification. In any event, caries beginning on cuspal points in the absence of abrasion and traumatic injury is significant of early development deficiency. The sooner the profession in general recognizes that early dental caries whether in fissures and pits or in usually immune areas indicates imperfections often traceable to development deficiencies, the better for all concerned, and it is hoped that the all too prevalent practice of advising that such small areas of decay be left till they are larger will soon be entirely discontinued.

Fig. 6.—Teeth of 11-year-old boy.

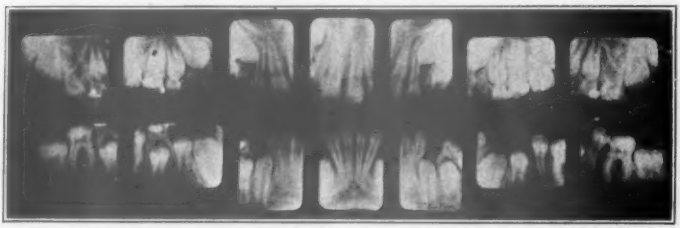

Fig. 7.—Teeth of 11-year-old boy.

It is not necessary to demonstrate that all or even the majority of surface defects in children's teeth extend to the dentin in order to accept small carious areas as significant of rapid disintegration and early loss, and as originating from conditions either local or systemic which may be corrected or whose influence may be inhibited. No operative procedure can

entirely rectify deficiencies in tooth development, and in no instance eliminate the actual cause; but such openings can be closed against the initial carious process, or, if caries has already begun, its advance can be stopped early in its progress.

To repeat: The conditions mentioned above may be caused by systemic influences which may have disappeared by the time the child applies for dental service. Whether dietary discrepancies are active causative agents can be inferred, but not proved, in the course of the ordinary chair examination. Actual determination of such imbalance can be made only by careful and prolonged study of the case. If many of the teeth are involved, the parents' attention should be called to the indications of dietary deficiency and metabolic dysfunction. This advice should apply to both the deciduous and the permanent teeth.

Luckily, a large percentage of cases can be traced to dietary habits; when appropriate advice with close cooperation of the parents and the child often has good results in inhibiting further carious advance and in improving the general health of the patient. So much has been said about the influence of diet upon dental diseases that it is out of place to more than mention it in this short presentation. While a relatively small number of these are gland cases, we are taking care that in suspected cases patients are always advised to take physical examinations for the determination of probable causes.

Extensive caries, disproportionate dentition, malocclusion, hypoplasia, distrophy of the enamel, etc., singly or in combinations indicate that physical examinations are in order and that local procedures alone may offer only transitory results. The etiologic factor of these conditions must be determined. If there is a prenatal condition, the etiologic factors when known often suggest glandular therapy. As one illustration of oral manifestations of glandular involvements: A boy 11 years of age applied for orthodontic service at the college clinic. The preliminary examination revealed that he had pronounced caries, extensive enamel hypoplasia and distal occlusion. Dental roentgenograms gave evidence of lack of calcium fixation in the alveolar bone. The patient was then referred to the medical clinic for a complete check up and was found to present a well-marked Fröhlich's syndrome, i.e., pituitary, thyroid and gonad deficiencies. He was 30 pounds overweight and was behind in his school work. After two years of treatment, he, while large for his family, had lost his excess fat and was alert mentally and up with his school work. He had developed normally in all respects and was considered a fit subject for orthodontic adjustments. It is believed that this lad has been benefited physically and mentally as a result of the decision that his oral condition was a symptom of a physical discrepancy, and treatment, if withheld till he was well along in his teens, would not have resulted so favorably since early treatment of gland cases assures the best results.

Sixth and Oregon Streets.

PULP PROTECTION IN RESTORATIVE DENTISTRY

By J. R. Tipton, D.D.S., Dallas, Texas

THE practice of making restorations of metal and placing inlays of bone, agate and other available materials in carious cavities of teeth is as old as antiquity itself. In the modern era, as dental science has advanced, the diversification of metals, cements and silicates utilized for this and other reconstructive purposes in tooth repair has become increasingly great and complex. Yet, in extensive study of the literature dealing with these materials and their manipulation and application, we are confronted with a woeful insufficiency of information relative to the effect of these various foreign substances upon the tissues of the tooth itself.

It is a fact that each metal filling, each cement and silicate filling, does irritate the dentin and the pulp in varying degrees of intensity, and it is the purpose of this paper to outline methods of protecting the dentin and the pulp from these influences, and also from the effect of ingestion of toxic products by the dentin during the progress of caries.

We must not consider the hard tissues of a tooth as inert substances, since capable investigators have, through their research, obtained definite evidence that they are not inert, and have made their findings available to us in the literature of the past decade.

Bodecker and Applebaum[1] point out that:

The varying permeability of the dentin has a definite bearing on our operative procedures. The study of dental tissues under the microscope shows that many of our restorative operations would be failures were it not for the marvelous adaptability of nature. This counteracts external irritations, and leaves the patient comfortable and unconscious of the activity of the dental pulp, which has had to adapt itself to new conditions.

Attention, therefore, should be given to the varying permeability of the dentin by which external irritation may be transmitted to the pulp, and the obvious bacterial phase made particularly serious by the operative procedures upon carious teeth, which are even more serious upon non-carious teeth, in preparation for bridge abutments and other forms of reconstruction. Teeth affected with caries are less permeable than sound teeth.

It is a known fact that there is a marked difference between the permeability of the dentin of the teeth of a child and that of adult dentin, as stated by Bodecker and Applebaum. After the eruption of the teeth, the dentin is highly permeable for several years; hence, dental caries penetrates rapidly and deeply, involving the pulp in a comparatively short time. This permeability is progressively reduced after adolescence. Therefore, the toxic materials produced by caries must be neutralized before any filling materials are placed in the teeth, to prevent their continuing penetration through the dentinal tubuli into and involving the pulp.

First, let us consider the neutralization

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of these toxic materials and methods of sterilizing relatively shallow cavities. If the cavity of the tooth under preparation is to be filled at the same sitting, the procedure suggested is as follows: After cavity preparation has been completed, the tooth is isolated from the surrounding tissues and fluids of the mouth by means of absorbent rolls or the rubber dam.[2] Tooth and cavity are bathed with ethyl alcohol and dried thoroughly with warm air, followed by the application of chloroform and warm air. A saturated solution of phenol is then applied within the cavity and allowed to remain for two minutes to cauterize the severed ends of the dentinal fibrils. The obtundent action of this drug is obtained thereby, as well as the germicidal effect on whatever residual infection may have advanced into the dentinal tubuli beyond the actual area of decalcification and apparent destruction of the caries, and beyond the hypercalcified transparent zone as described by Bodecker and Applebaum. The phenol is then neutralized by another bath with ethyl alcohol and the cavity is again dried with warm air. We are now ready to insert an intermediary varnish between the dentin and the filling, penetrating the dentin vacated by the toxins and amino-acids just neutralized or removed, and sealing over the cut ends of the dentinal fibrils. The permanent filling may then be introduced.

If an inlay or crown is to be used in restoration, a suitable temporary filling or crown is inserted that will completely seal the prepared dentin and keep it surgically clean until a subsequent sitting, at which time the procedure of cleaning and protecting the dentin outlined above is carried out and the filling or crown is placed.

It is advisable occasionally, especially in jacket crown preparations, to clean the prepared crown with a mixture of green soap and pumice before protection of the dentin is undertaken.

CAVITY LINING

Since spirit varnish is perhaps the most universally applicable agent in pulp protection, its description and application should now be considered.

After the cavity toilet and immediately before the insertion of any silicate or metallic filling, or the cementation of crowns and inlays, the prepared tooth having been isolated with the rubber dam or absorbent rolls, all exposed dentin should be thoroughly desiccated and the routine technic of applying alcohol, chloroform, phenol and alcohol above described be carried out, each followed by drying with warm air. Spirit varnish should then be applied with a suitable small instrument upon which has been wrapped a wisp of cotton suitable for painting the varnish upon these surfaces without applying it to the enamel margins of the cavity. This application is allowed to dry for thirty seconds or more, the procedure being repeated until the dentin presents a glazed surface, denoting its saturation and imperviousness to absorption of the irritant liquids in silicates and cements. The spirit varnish also affords added adhesion to these plastics, protects the wounded ends of the dentinal fibrils, overcomes sensitiveness resulting from thermal extremes, occupies no essential space and presents a perfect foundation for restorations.

Germicidal drugs, such as phenol and chlorbutanol, which are likewise obtundents in action, may be used in conjunction with this varnish when considered advisable. The use of this varnish in deep-seated cavities after treatment and before and after application of reinforcing cement bases is also advised.

The use of violin rosins, chloroform or waxes is contraindicated, because they contain extraneous matter. The use of rosin and solvents is contraindicated because only rosin, which will crack and craze, remains after evaporation, and the lacquers are contraindicated because of their viscous nature, difficulty of ap-

plication and the fact that they fill in angles and undercuts and dry slowly, causing volume change and spaces under fillings or crowns; and because they are not adhesive and make unsuitable foundations for restorations.

An exhaustive description of copal varnishes and their preparation is included in an article by Dr. Gordon,[3] former Secretary of the Council on Dental Therapeutics, of the American Dental Association. It appears, however, that gum copal and solvents alone do not fulfil completely the purposes of a cavity lining varnish and that the addition of correct amounts of rosin, ester gums and phenol-formaldehyde resins increases penetration, density, hardness and surface tension.

The excellent article by Cooley[2] deals with the subject of spirit varnishes and their constituent resins, properties and application.

In deep-seated caries, the mechano-surgical procedures should not be completed at the first sitting. Instead, the weakened enamel walls should be broken down and the superficial infected dentin be gently removed with spoon excavators. When complete access is obtained, the cavity is thoroughly medicated with chloroform followed by phenol; dried, and a treatment of eugenol sealed in for two or three days. When the patient presents himself again, all decay and débris are removed and the cavity is then treated with a paste of zinc oxide and eugenol to which is added 10 per cent phenol, for another period of two or three days. At a subsequent sitting, the cavity is thoroughly cleaned with chloroform to remove essential oils and amino-acids. Then the use of alcohol, phenol and alcohol as described above is carried out, followed by the application of the intermediary varnish. The lost dentin is then replaced with a mix of oxyphosphate of zinc and copper cement, to which may be added a wisp of fiber, or a small amount of silver-tin alloy. The cavity preparation is then finished and the restoration of the tooth with a permanent filling is carried out.

Whenever sustained medication of cavities over a period of days or longer is desired, this routine should be carried out prior to the application of varnish, since deep penetration of the drug is desirable, and the varnish, as before stated, seals the tubuli. In other words, the dentin should be saturated with the medicament, which is then sealed in with the varnish.

If a crown or inlay is to be employed, it is necessary to protect the tooth and cavity by means of a temporary inlay or crown, made of some low-fusing alloy, aluminum or coin silver and copper, during the restoration. This makes an excellent matrix for a palliative which can serve as the temporary cementing medium, and such a temporary protection, if properly made with regard to contact points and occlusion, also prevents any possible drifting of the tooth between sittings.

As before stated, filling materials must be considered as foreign bodies which are irritating to the dentin and pulp in varying degrees, and these irritating factors may be classified as (a) chemical, (b) mechanical and (c) thermal. Every precaution must be exercised to prevent these damaging influences upon the dentin and pulp.

As long ago as 1890, various changes in dentin under different filling materials were observed,[4] and attention has repeatedly been called to the superior qualities of cements over metals as regards resistance to thermal conductivity. Germicidal qualities of certain cements have also been noted.

Manufacturing chemists are constantly endeavoring to introduce new compounds for therapeutic purposes. These new remedies have become so numerous that it is impossible for the average practitioner to keep pace with their production and the extravagant claims made

for them. Paradoxically, most of these supposed remedies disappear before they become generally known, and only a few prove to possess merit sufficient to warrant permanent places in our therapeutic armamentarium. There is a possibility of much harm from using medicaments with which we are not familiar, especially if we have no definite knowledge of their actual composition. We should, therefore, guard against using products which are backed solely by the biased indorsement of manufacturers.

Let us now consider the treatment and care of mechanical exposure of a horn of an apparently healthy pulp. This is a procedure which is desirable when no infection exists or whenever the extent of the exposure does not render it impossible. The percentage of success in judicious pulp capping warrants our best efforts to assure the protection and continued vitality and function of the pulp, especially in the teeth of young patients. The procedure is as follows:

1. The tooth is isolated with rubber dam.

2. Ten per cent ethyl alcohol and air are applied until the slight hemorrhage is terminated.

3. With a warm instrument, a thymol and zinc oxide (C. P.) mixture is flowed over the area of exposure.

4. This area is protected with a complete filling of resinous cement and the patient is dismissed.

The following formula is excellent for this purpose.

Powder

	Grains
Zinc oxide	320
Calcium hydroxide	370
Rosin	155
Thymol iodide	20

Mix and make a powder.

Liquid

Powdered rosin	100 grains
Phenol	320 minims
Eugenol	160 minims

Mix and make a solution.

5. A week or longer is allowed before removal of the excess of resinous cement, clinical testing of the pulp for vitality and insertion of a temporary filling, which should be set with a temporary medicated cement. If the pulp tests indicate vitality after a period of thirty days, the permanent filling may safely be placed.

CONCLUSION

1. The hard tissues of a tooth must not be considered as inert substances.

2. Each filling, regardless of material used, irritates the dentin and pulp in varying degrees of intensity.

3. The dentin and pulp must be protected from these influences, and also from the effect of ingestion of toxic products into the dentin during the progress of caries.

4. Care should be exercised in the selection of remedies for tooth treatment.

5. An intermediary varnish should always be used after medication to seal the dentinal tubules before insertion of the filling.

6. Notwithstanding pulp capping is an uncertain procedure, it should be resorted to if the exposure is not too extensive, no infection exists and there has been little or no hemorrhage.

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1205 Medical Arts Building.

THE INNERVATION OF TEETH

By FRIEDRICH WASSERMANN, M.D., Chicago, Ill.

THE irritability of the dentin to physical and chemical stimuli may be due to the presence of living protoplasm within the dentinal tubules or to an innervation of the dentin itself. There has been a controversy for the past fifty years as to whether nerve fibers are really to be found within the dentin.

In addition to recognizing the irritability of the dentin, of which we are not conscious under normal conditions, we have to keep in mind the fact that the teeth are important organs of touch which keep the chewing pressure under control. Does this function also depend on the innervation of the teeth themselves or does the tactility of the teeth have different sources?

I do not think it necessary to review the literature since it was done in recent years, by Berkelbach van der Sprenkel in 1935 and by Lehner and Plenk in 1936. It may suffice to emphasize the fact that since the publication of Berkelbach, many histologists are, like Lehner and Plenk, convinced that in both human and mammalian teeth, nerve fibers enter the dentinal tubules. However, if they think, as they seem to, that the whole problem of tooth innervation has been solved, they are wrong. I shall show you how many important questions have been left open by these investigations, even regarding the innervation of the dentin itself. Furthermore, the data are incomplete, for the whole problem of the innervation of teeth goes far beyond the question as to whether nerves are to be found within the dentin. We have to consider the whole distribution of the nerves entering the pulp cavity in order to find out whether they *all* end within the dentin or there are nerve fibers which have a different destination. We must ask whether the innervation of a tooth is the same in all its parts or there are differences, especially between the crown and the root. Practically nothing has been done until now with regard to the development of tooth innervation from the point of view of either embryology or comparative anatomy. Only a study of the innervation of teeth as a whole will prepare the foundation for a discussion of the functional significance of histologic observations and for further experimental research.

The problem in question was and still is one of the most difficult in histology because of the technic of demonstrating nerve fibers and their endings in histologic preparations. The different methods of silver impregnation of nerves are the most delicate of all histologic methods. Unfortunately, this is especially true of the conditions in teeth. The method worked out by Bodian in the anatomy department of the University of Chicago proved to be of great value for our purpose, as I found by comparing it with the older methods, especially that of de Castro, which is usually recommended in combination with decalcification. The technics that we have applied, i.e., Bodian's and de Castro's impregnation

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Read before the Section on Therapeutics, Pathology and Research at the Seventy-Fifth Annual Midwinter Meeting of the Chicago Dental Society, February 14, 1939.

methods, embedding the teeth in celloidin or celloidin-paraffin after decalcification, and cutting them in complete series of sections, eliminate certain objections which have been raised in former discussions of the reliability of silver impregnation. The nerve fibers that I shall show you are undoubtedly nerve fibers and not connective tissue fibers, and the nerve endings that I found are true nerve endings. Every silver impregnation

Fig. 1.—Longitudinal section through first molar of 15-day-old rat; showing main distribution of pulp nerves. Following the blood vessels, the nerves branch toward the horns of the pulp. There, they form the plexus shown in Figures 5 and 6. n, nerves. (Bouin's fixation; Bodian's silver impregnation; × 120.)

method is uncertain and capricious in some respects, and in evaluating the results, one must keep this in mind. The observations of which I shall speak have been made on rat teeth. It remains for us to consider how far they may be of general significance in comparison with what has been found in human teeth.

The general distribution of the pulp nerves can be followed only in continuous series of sections through teeth. For that reason, former investigations did not show the whole pattern of the pulp

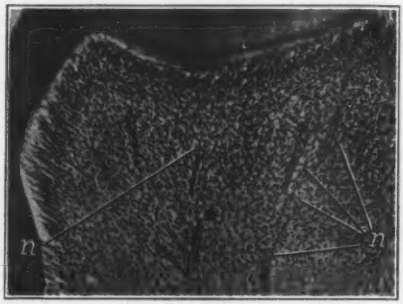

Fig. 2.—Section from series one of which is shown in Figure 1. n, nerves.

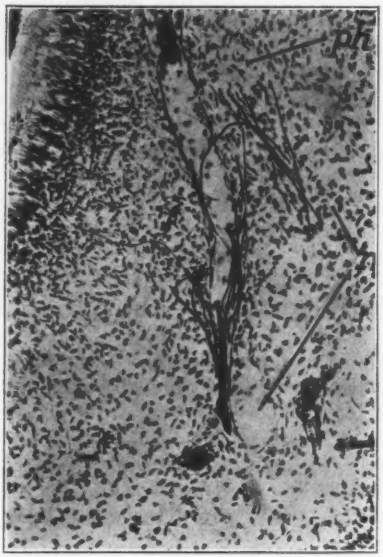

Fig. 3.—Detail of section as in Figure 1, showing splitting of nerve bundles toward odontoblasts. p, pulp; n, nerves. (×150.)

nerves. My observations confirm in general what has been said, that the nerves follow the blood vessels, although there

are also nerves with no relation to the blood vessels. (Figs. 1, 2 and 3.) What was striking to me was the fact that in every case the branching of the thicker nerves takes place mainly within the crown, while there are but very few fibers distributed to the tooth wall in the root. Drawings of Retzius which demonstrate the distribution of the pulp nerves in lower vertebrates, gobius and lacerta (Fig. 4), show the same ramification

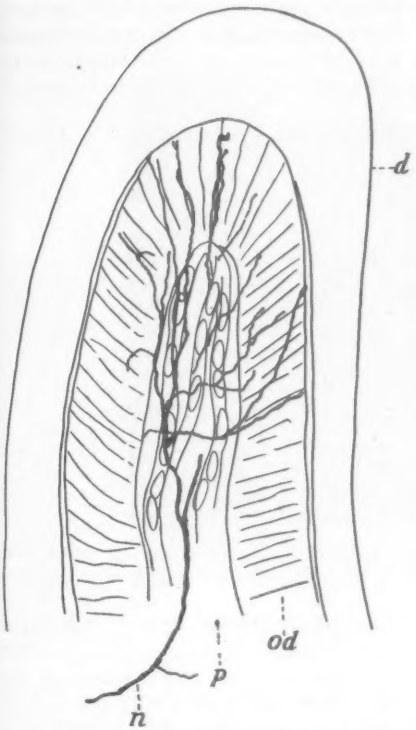

Fig. 4.—Longitudinal section through tooth of Lacerta agilis. (From Retzius.)

toward the crown. We may exclude the possibility that our impregnation methods fail consistently to reveal nerve fibers within these parts of the pulp when they were present, while much finer fibers within the pulp horns are clearly stained.

When I compare my findings on the rat with the findings of Retzius on the lower vertebrates and with certain observations by Tiegs on a single human tooth, I am convinced that there is a general pattern of distribution of nerves which has not yet been considered; that is, the strikingly different innervation of the tooth wall in the crown and the root. In connection with this mode of ramification, there is also the fact that the well-known nerve plexus within Weil's layer below the odontoblasts is developed only within the crown of the rat molars. (Fig. 5.) The observation by Tiegs mentioned above consists in his finding especially coarse fibers within the subdentinal zone in the crown only. That means that there are at least more nerve fibers here than elsewhere, because coarse fibers contain more fibrils than thin ones. The difference between a zone with coarse fibers and others without them could be balanced only by a far greater number of fine fibers. But such observations were not made, and thus we are justified in thinking it probable that also in human teeth the innervation of the crown is much richer than that of the root. Further investigations should be made on this point.

Following the series of sections through a rat molar, we find the subodontoblast plexus of nerves fully developed only in a few sections corresponding to the extension of the pulp horns. Also, in the saddles between the horns, the plexus is present. The repeatedly voiced idea, based upon the partially ectodermal origin of the teeth, that a tooth or, better, each pulp horn may be considered as homologous to an epidermal papilla, seems to be supported by this kind of nerve distribution; for it is the same in principle as that of the sensory nerves in those papillae and different only in the magnitude of the plexus and the far greater number of fibers. Further comparative anatomic studies of tooth in-

nervation will have to substantiate the value of this point of view.

Before a more detailed consideration of the subodontoblast plexus, a few words may be said about the development of the innervation of teeth. It was stated first by Walkhoff, and later by Hammar (1937) in his investigations on neurotization in the human embryo, that the tooth germs do not possess nerve fibers. But Hammar's statement is not quite clear; for, summarizing his observations, he says that the dental papilla is not only surrounded by nerve fibers, but also contains some fibers from the beginning. I cannot confirm the latter statement. I have never seen nerve fibers within tooth germs in rats. As a matter of fact, nerves begin to enter the dental papilla only after birth. In the teeth of rats, neurotization takes place between about the eighth and the fifteenth day of postnatal life. At this time, the hard substances have been laid down to a considerable extent. This statement corresponds with experimental and clinical experiences, which have proved that neither formation nor, apparently, maintenance of the hard tissues depends on the nervous system. This is certainly true of the earlier stages of development. Glasstone (1936) succeeded in demonstrating the development of tooth germs *in vitro*, where there is obviously no general nervous influence.

Whether, later on, the nervous system may exert some influence upon growth and maintenance of teeth must be clarified by further experiments. The experiments of Moral and Hosemann in 1919 indicated such an influence; but they left open the question as to whether certain changes may be due to the absence of trophic nerves after the lingual nerve had been cut or whether only vasomotor conditions had been altered. It is necessary to point out these questions before demonstrating my observations on the finer innervation of teeth; for only if you consider such problems with their background will you agree with me that our observations must be extended in all directions as far as possible, and not limited to such questions as whether nerves penetrate some or all dentinal tubules. You will also agree that the time has not yet come to draw definite conclusions regarding the innervation of teeth, since also in this case the histologic findings

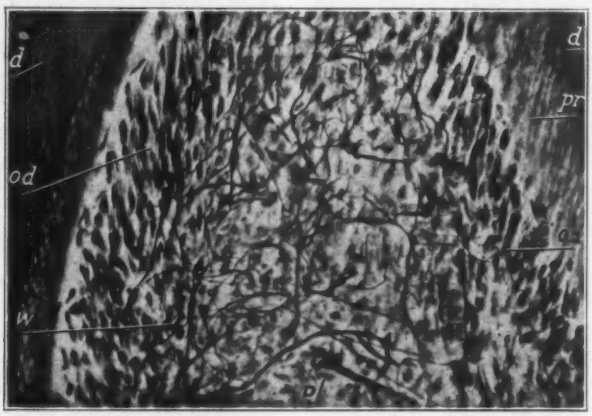

Fig. 5.—Pulp horn of 30-day-old rat's molar; nerve plexus. d, dentin; pr, predentin; od, odontoblasts; p, pulp; w, nerve plexus. (Bouin's fixation; Bodian's silver impregnation; ×300.)

will have to be the basis of experimental studies.

In connection with our investigations on the development of tooth nerves, which I am not speaking of in detail today, it may be of interest to learn that the permanent growing incisors of the rodents do not have the same nerve supply as the molars. The incisors are kept at a stage where, as in the early neurogenesis of molars, there are only a few nerve fibers to be found in connection with the blood vessels and no plexus has developed at all. Thus, the permanent growing incisors of the rodents are merely permanent tooth germs as regards their innervation. From a teleologic point of view, we may say that a nerve plexus, as in adult teeth, and any innervation of the dentin would not be possible with the continuous transformations to which the permanent growing incisors are exposed at their tops. If nerve fibers were present there, they would be worn off with the hard tissues, which certainly would be incompatible with their function. As is true in general, the teleologic interpretation does not involve an explanation, but it may be stimulating with respect to investigations on the histologic transformation within the permanent growing teeth which are under way in our laboratory.

Let us go back to the nervous plexus within the pulp horns in order to examine it more accurately. (Fig. 6.) It is a network of coarse to very fine fibers. Many of the finest nerve fibers are lost within the pulp, and only occasionally have we been able to make sure that there are true endings of fibers at some of the pulp cells. All observers agree that the blood vessels get their nerves from the adjacent bundles which are often very closely related to the wall of the vessel. I mention this only in order to recall the obvious fact that there are certainly many sympathetic fibrils among the pulp nerves. We do not know how large their number may be as compared with the number of

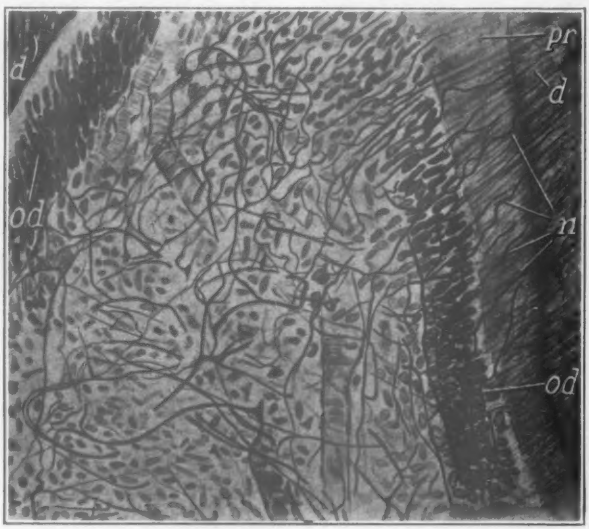

Fig. 6.—Drawing of section shown in Figure 5. The nerves to the dentin are shown which are not in focus in the photomicrograph.

sensory nerves. There we have another question which will not be answered by histologic investigation, but only by experiment.

We can see very easily that within this section from which the drawing was taken a few nerves pass through the odontoblastic layer until they reach the mouth of a dentinal tubule. We saw many such nerves distinctly at the very entrance to the tubule. (Figs. 7, 8 and 9.) No doubt, there we have the nerves existence of which was denied so often, the

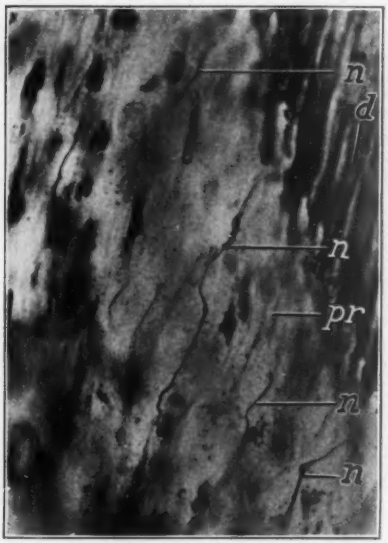

Fig. 7.—Detail from Figure 5. n, nerves from plexus to dentinal tubules as shown in Figure 6. d, dentin; pr, predentin; n, nerves. (×1,200.)

true dentin nerves. Unfortunately, it is characteristic of the impregnation technic that the dentin itself becomes more or less stained. It is also very probable that nerve fibers embedded in the dentin resist the precipitation of silver salts on their surface; therefore, we cannot trace these nerves farther than to the entrance of the tubules except in a few cases where we are able to see them within the tubules themselves, at least for a short distance from the entrance. Thus, we can say that nerve fibers are present within the tubules along Tomes' fibers, and not, as has been stated repeatedly, between the tubules within the dentinal tissue itself. However, we do not know how far they go and how they end. Berkelbach's drawings show more than that. He asserts that these fibers should be embedded within the surface of Tomes' fibers and that they end with small needle eyes at this surface.

Tiegs' and Riegele's observations, which are in complete accord with mine on

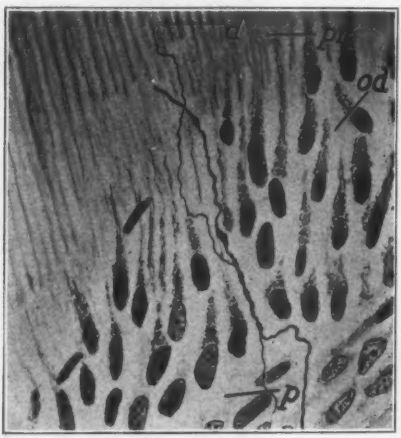

Fig. 8.—Rat molar; single nerve fiber traced from plexus to calcified dentin entering tubule.

this point, have been made in human teeth. I agree with Tiegs that the nerve fibers, being for the most part very thin, cannot be extended very far, and that it does not seem probable that the surface of the dentin could be provided with nerves. As to the observations of Berkelbach, I do not think that there are real differences between our findings. Whether the fibers are embedded in the surface of the Tomes fibers will not be decided by observation. Berkelbach was apparently influenced by the general

ideas of his teacher Boeke concerning the intraplasmatic position of nerve fibers. It would be of no use to start a discussion in this direction. This is a general histologic problem and probably will be decided with more favorable material. How far the nerves follow Tomes' fibers may possibly have been clear for only six fibers in Berkelbach's three drawings, Figures 4 to 6, and, even there, they are not traced very far. (Fig. 10.) But, in his diagram (Fig. 11), Berkelbach

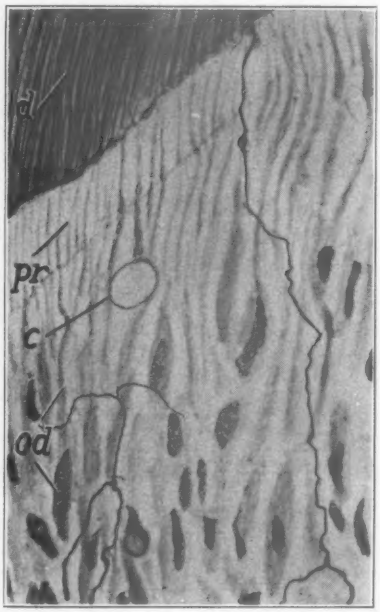

Fig. 9.—Molar shown in Figure 8. Besides the fiber to the dentin, there are fine nerves ending between the odontoblasts. c, capillary.

pointed out that the fibers may go on to the surface of the dentin, and he thinks it possible that they may even continue into the enamel as far as Tomes' fibers do. This is by no means justified by his findings; nor is what he says about the endings, for the two endings which I can see in his Figure 6 (Fig. 12) do not belong to nerve fibers within the calcified dentin and they cannot be taken as examples of the endings of the dentin nerves in general.

Therefore, it is only by interpretation

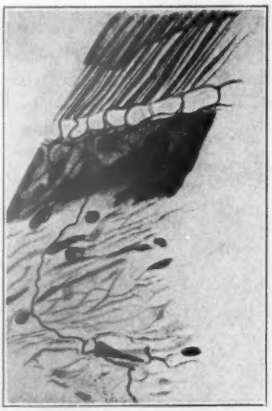

Fig. 10.—Neck of human premolar. (From Berkelbach van der Sprenkel.) "Nerve fibers ascend from the pulp cavity, form a network between the cell bodies of the odontoblasts and enter the tubuli of the dentin." (Bielschowsky-Gros method.)

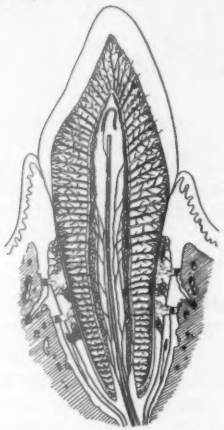

Fig. 11.—Drawing from Berkelbach van der Sprenkel. "Scheme of the neurological relations within and around the tooth. Left half: The results obtained; right half my [Berkelbach's] conclusions from these findings."

that Berkelbach seems to have had results which go beyond what I have observed

on dentin nerves. This holds especially for his conclusion that almost every Tomes' fiber should be provided with a nerve. My preparations do not prove such an abundance of dentin fibers, within either the crown or the root. It is true that our methods are not reliable enough to make us sure that there are really no nerves where we cannot trace them; but where the plexus itself has been impregnated sufficiently, we would at least not miss the beginning of such nerves extending to the dentin, even if we could not follow them to the tubules.

It is very easy to get a wrong picture of the number of dentin nerves in rat molars by a misinterpretation of

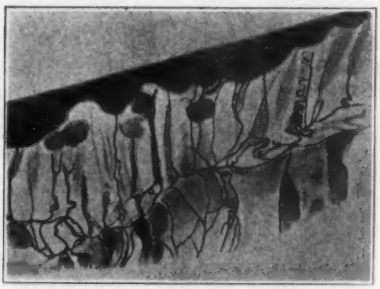

Fig. 12.—Neck of human premolar. (From Berkelbach van der Sprenkel.) "Pulp nerves form a network between and on the top of the odontoblasts and enter the dentinal tubuli. One of them ends in a nerve end-ring situated on the fiber of Tomes." (Bielschowsky-Gros method.)

loops or arches rising from the plexus (Figs. 8 and 14). Such loops are very frequent. They are formed by fibers of different diameter down to very fine ones. Sometimes, but not always, fibers leave the arch and may go to the dentin. It happens often that only one of the two legs of such an arch lies within a given section (Fig. 8), while the other is to be found in the next. If we are not aware of these formations, we may regard such fibers as dentinal. According to Riegele's description (Fig. 13), arches of the same kind and position are present also in human teeth. Berkelbach's drawings do not show them. I do not say that Berkelbach was misled by misinterpreting some legs of arches, but it could have been the case in some of the former investigations.

The arches themselves are formations which should not be overlooked; for it may be that they are more than an

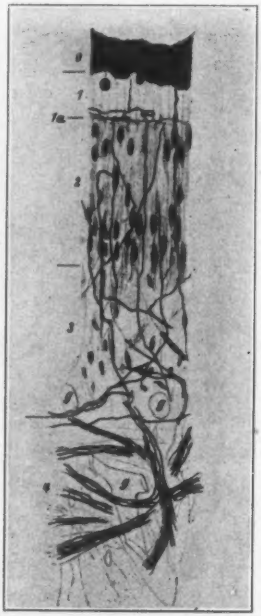

Fig. 13.—Distribution of nerves from plexus (4) through subodontoblast layer of Weil (3) and odontoblasts (2) to uncalcified (1) and calcified (0) dentin; schematic drawing showing findings in human teeth and proving that there are to be found also in human teeth loops of nerve fibers shown in Figure 14. (From Riegele.)

incidental and meaningless deviation of parts of the plexus. Often, they touch even the limit of the predentin, extending the plexus as far as possible toward the surface. (Fig. 14.) It may be that the varicosities which frequently inter-

rupt the smooth course of the arch-forming fibers are of functional significance, although they are very common features of all finer nerve fibers. It has not yet been decided whether they are artefacts or pre-existing, perhaps temporary, structural differentiations which may be of the same significance as similarly built nerve endings. Since the latter possibility cannot be denied, we have to keep in mind these formations from a functional point of view.

Berkelbach did not consider nerve endings besides those within the dentinal tubules or those within the walls of

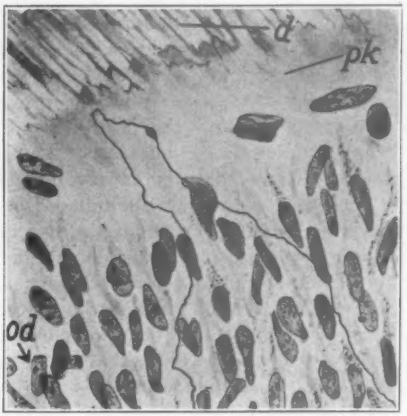

Fig. 14.—Molar of 30-day-old rat. In tracing the nerves from the plexus, fibers not only to the dentin (Figures 6-9) and the odontoblasts (Figures 9, 15), but also fibers ascending sometimes for the extent of the calcified dentin and turning back, forming loops are seen. (Same technic as in Figures 1-9.)

blood vessels. Other investigators in recent years, like Riegele, admitted also an innervation of the odontoblasts, a finding which lent weight to certain theories about a sensory function of the odontoblasts. But Berkelbach claims that all the myelinated pulp nerves terminate in the intradentinal endings, all the non-myelinated within the vessel walls.

In contrast to this statement, we found that there are fine nerve fibers which do not belong to either group. Tracing many nerve fibers from the plexus to the odontoblast layer, we observed again and again free nerve endings within both the odontoblast and the subodontoblast layer of Weil. It seems necessary to keep separate the findings within these two layers.

Figure 15 is a drawing of nerve endings between the odontoblasts. To be

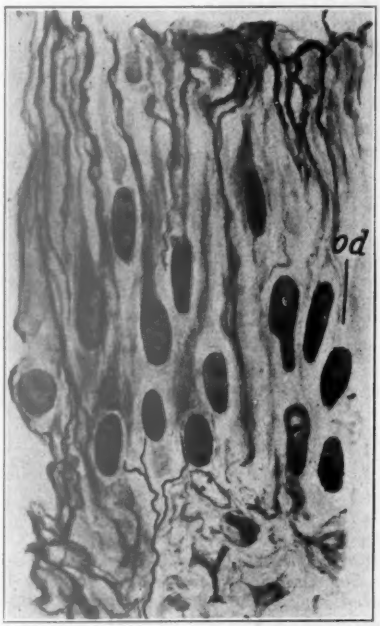

Fig. 15.—Isolated pulp of first molar of 8-day-old rat. Nerve fibers ending on surface of odontoblasts. (Bouin's fluid; Bodian's silver impregnation.)

sure that we are dealing with real nerve endings, they must, it is quite obvious, be situated *within* the section, so that tissue can be focused above and below them. If we do not keep our attention on this point, we may misinterpret artificial endings of a fiber resulting from its having been cut for free endings. Besides this source of error, there remain

others which can be avoided only by experience with the limits of our technic and the artefacts it may produce. Excluding these possibilities, I feel justified in showing this branching off of a fiber and the termination of its three end branches. There is no doubt that the endings take place in the immediate neighborhood of typical odontoblastic nuclei. Since there is no blood vessel nearby, the fibers cannot be vasomotor. The impregnation does not outline the cell bodies. Therefore, we cannot say that the nerves are connected with the surface of the odontoblasts, but I think it very probable in view of the whole situation.

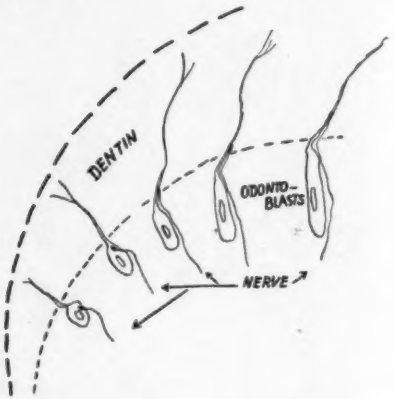

Fig. 16.—Schematic drawing showing how nerve endings at odontoblasts may be drawn passively into dentinal tubules by growing and transformation of odontoblasts during production of dentin.

These findings and some similar ones were made in teeth of 14-day-old rats. The former preparations I showed to demonstrate that the dentin nerves were from adult rats. Although the possible significance of the innervation of odontoblasts has been repeatedly discussed, I do not think that such findings in young teeth justify the distinction between odontoblast innervation and the previously demonstrated dentin innervation. We have to remember that in a developing tooth, during the ingrowth of nerves, there are probably two processes: While the nerves are extending their growing ends toward the odontoblasts and the dentin, it is probable that, during the formation of the dentin, the odontoblasts become progressively included in the dentin as Tomes' fibers, and if a nerve fiber had been attached at an earlier stage to an odontoblast, it may be passively included with the Tomes fiber within the dentin. (Fig. 16.) This point of view is of hypothetical character as long as we do not have more exact data on the process of growth and transformation of the odontoblasts. But this concept, which has not been considered before, is, I think, a necessary consequence of what we know of the formation of dentin and the effect it must exercise upon the odontoblasts. Therefore, I believe that the innervation of odontoblasts cannot be separated from the so-called innervation of the dentin. Should we find odontoblast innervation also in adult teeth, we should have to ask whether some odontoblasts have been left behind the others, or whether a retarded attachment of nerve fibers to their cell bodies may occur.

Certainly different from an innervation of odontoblasts is another nerve-to-cell relation that we have found. Some cells of Weil's layer are provided with very fine nerve fibers which can be derived from the subodontoblastic plexus. (Fig. 19.) In this case, a very close relation between the nerves and the cells is beyond any doubt. The nerve endings are definite ones because they are furnished with end buttons. These little end-organs are placed next to the wall of the nucleus. Moreover, the nuclear wall shows a distinct indentation opposite the end button. Since the cell body has not been stained by this method, the relationship of the nerve fiber to the cytoplasm cannot be observed; but it is hard to believe that the presence of

a nerve ending at the cell surface could cause an indentation of the nuclear membrane.

On the basis of our knowledge of intracellular nerve endings elsewhere within the body, I do not hesitate to recognize an intraplasmatic nerve-to-cell connection in this case, which was unknown until now. It is very apparent that the regularity of its occurrence is beyond doubt, although we cannot expect to find such delicate nerve endings often in our preparations. In one of my cases, even a double innervation of the cell is obvious. (Fig. 18.) The cells to which the nerves are attached are not visibly different from any pulp cells of Weil's layer. Besides the nerves bound to single cells, free nerve endings are also to be found among the subodontoblastic pulp cells.

Summarizing these findings, we may say that, in addition to the dentin nerves, another type of tooth innervation has been discovered which was not anticipated by Berkelbach or others, although the meaning of this new type of innervation is not yet apparent. Thus, the plexus nerves are not only dentin nerves or vasomotor nerves, but there are in addition many free and intracellular nerve endings within Weil's layer and among the odontoblasts. It cannot be determined with certainty whether some of them find their ends at the capillaries which form a rich plexus between the odontoblasts, for the innervation of capillaries is the most difficult to demonstrate. But some of my observations, like that shown in Figure 20, make it at least very probable that these capillaries are kept under the influence of nerves, as we may expect from the general experience with blood vessels in the body.

The whole distribution of the pulp nerves has, I think, been outlined more accurately by our investigation than it has been previously. But, as is usually the case, the interpretation of the findings becomes more difficult than it was before. Therefore, the time has not yet come, I think, to formulate a theory of the innervation of teeth which would agree with all of our observations. We shall have to continue this investigation by both observation and experiment; but I should like at least to conclude the demonstration of facts with a few re-

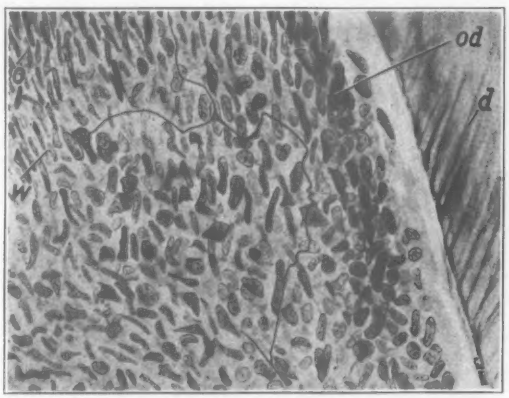

Fig. 17.—Nerve-to-cell relation between nerve fibers from plexus and cells either between Weil's layer or between odontoblasts. The nerve fiber ends at the surface of the nucleus with a small end button. This ending is embedded in an indentation of the nuclear wall. (Technic as in Figure 15.)

marks about the functions of the nerves as far as they may touch even slightly the clinical point of view.

It seems to me of interest to see how near to the dentin the subodontoblastic nerve plexus is situated, and how far toward the surface some of the demonstrated arches are drawn. Should we not think that the plexus itself, especially its outermost extensions, may be responsible for the extraordinary sensitivity of the teeth to heat or mechanical or chemical stimuli if they are applied near the pulp cavity? A network of fine nerve

Fig. 18.—Intracellular nerve ending of type shown in Figure 17, with difference that here two nerve endings are attached to one cell.

fibers may be a receptor in itself, as we can believe with Stöhr. In the meninges, for example, there is a closed network with no free endings at all. If the varicosities of the nerves that I demonstrated were a kind of small receptor-like nerve endings, this idea would be more acceptable.

On the other hand, that the ability of the dentin to receive stimuli is due to the nerves within the canals has been corroborated by our investigation. But I would rather believe that the tooth, being a nervous organ like an epidermal papilla, acts or, better, suffers as a whole whenever it undergoes serious irritation. It is the whole network of nerves within the pulp that is involved in such attacks.

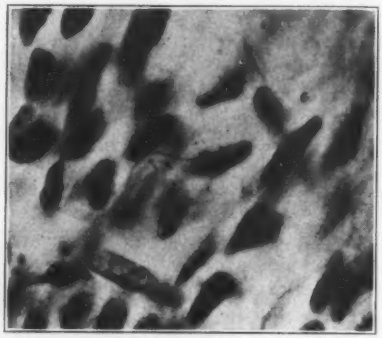

Fig. 19.—Nerve-cell relation shown in Figure 18. Only one of the two nerve endings is in focus. The end button and the indentation of the nucleus are to be noted. (×1,200.)

Fig. 20.—Ending of fine nerve fiber at wall of a blood capillary (c) between odontoblasts. (Technic as in Figure 15.)

If there is really a general difference between crown and root, it may seem strange at first glance that the neck of the tooth and the root are perhaps

its most irritable parts. But if we accept the idea of the expanding reaction throughout the entire nervous apparatus of a tooth, it becomes understandable that this reaction will be the more vehement the thinner the wall of the tooth is where there is irritation. I think the fact that we cannot localize such irritations agrees with this conception. But the sensibility of our teeth with regard to touch can be localized very accurately. It is impossible that the nerves of the dentin should be the anatomic substrate for the tactility of teeth. This is based exclusively on the well-known and repeatedly demonstrated innervation of the periodontal membrane and of the walls of the alveoli in general.

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RELATIONSHIP OF OSSEOUS STRUCTURAL DEFICIENCIES TO DENTURE PROSTHESIS

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IN the last decade, numerous improvements have been made in the technical aspects of denture prosthesis. Many procedures have been developed in order to assure precisional results. Regardless of the particular means of reaching this highly desirable goal, in certain cases, all prosthetists are confronted with changes in the alveolar ridges which sooner or later result in case failures. The dentures which were constructed with great care in order to comply with the esthetic requirements of the case and its mechanical difficulties are found to be no longer satisfactory. All of the precision and care expended have seemingly gone for naught. Both the patient and the operator are confronted with the annoyance of frequent rebuilding to maintain facial dimensions and functional stability.

Examination of a number of such cases reveals certain clinical similarities. The vertical dimension has decreased. The mandible has advanced, with loss of the centric relation so carefully established. The denture bases seem to have neither the stability nor the adaptation that they originally possessed. There are numerous small areas on the alveolar ridges which appear reddish, usually with a whitish circumference. These areas are quite sensitive and disappear readily if the dentures are removed for a few days. Frequently, the patient complains that the maxillary denture falls at the slightest provocation and that the mandibular denture will no longer remain in position.

Some of the profession are of the opinion that present prosthetic procedures involving delicate cuspal interdigitation are primarily at fault. These men assert that the improved efficiency, gained by carefully balanced occlusal relations and the use of anatomically formed teeth, results in undue stress upon the underlying osseus structures. As a consequence of the development of this school of thought, a number of so-called non-anatomic teeth, such as the Hall cuspless tooth, have been devised. These modified teeth are an aid in many cases, no doubt; but, frequently, the absence of cusps necessitates undesirable compromises with esthetic values. In fact, the kindest thing that can be said of many such teeth is that progressive closure of the denture space is permitted with less noticeable discomfort; in other words, bone atrophy is present, but is less painful to both patient and dentist. It would seem, therefore, that we might well look into this problem further than merely its mechanical or technical phases. The osseous structure is often probably culpable rather than the so-called exacting technics.

If numerous teeth are to be removed to clear up focal infection, some assurance must be given to the patient that he can have a reasonable degree of oral

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comfort while wearing dentures. If our precisional methods are to be employed to best advantage, we must first know the cause of bone atrophy. Then we should like to know how much atrophy may be expected and when it may be expected, and, furthermore, what we may do to prevent or at least minimize such changes.

A review of the dental literature dealing with the etiologic aspects of progressive atrophy reveals that the dental profession has done relatively little to contribute to the knowledge of this extremely important aspect of dental science.

The majority of papers written on this subject in the past have considered that resorption was either physiologic or was influenced primarily by mechanical conditions.

The first references in the literature to the subject of atrophy of the alveolar ridges attributed this condition to physiologic changes. It was assumed[1] that alveolar bone was of a different type from other bone and that, when the teeth were removed, the alveolar process disappeared, as it was adapted only to retaining the natural teeth. In fact, some textbooks have stated[1] that haversian canals are absent in the alveolar bone. The foregoing view of the situation has been very clearly disproved by MacMillan, who has shown conclusively[2] that alveolar bone is similar in every way to bone in any other part of the body and that, according to the laws of bone ar-

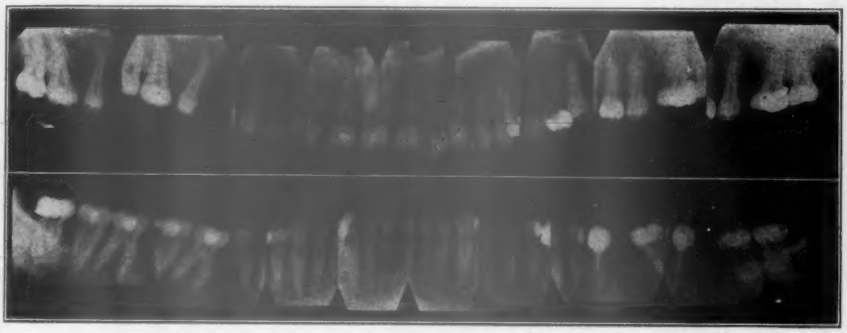

Fig. 1.—Normal bone.

Fig. 2.—Osteoporosis.

chitecture, the only change which would follow the removal of the natural teeth is a rearrangement of the trabeculae and cancelli in order to meet the change more effectively. It has also been pointed out by Hellman that in ungulates[3] an alveolar process exists, although it supports neither natural nor artificial teeth.

Hall[4] believes that compression of tissue modifies the blood supply and causes a loss of tone and atrophy from lack of nutrition. Hall quotes A. E. Smith, who states that, as age progresses and the arteries become sclerotic, the jaws do not secure the required amount of nutrition, and progressive atrophy is the natural result. It does not seem reasonable, however, to assume that the jaws, which ordinarily have a copious blood supply, should be affected by progressive atrophy to a greater extent than the other osseous structures of the body.

Key[5] calls attention to the fact that bone is a living tissue and, as such, is continually in the process of degeneration and regeneration, and that any factor which would upset the delicate balance between these two processes would be likely to lead to progressive bone atrophy. He also mentions that glandular dysfunction, particularly of the parathyroids, may cause changes in the calcium content of the osseous structure. Key differentiates between local bone atrophy

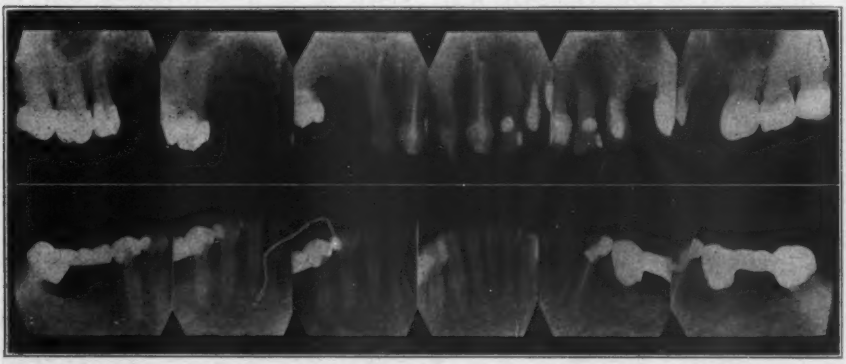

Fig. 3 (Case 1).—Appearance of case prior to extraction; showing osteoporosis.

Fig. 4 (Case 1).—Roentgenographic appearance of jaws three years after extraction.

(affecting a whole bone or bones) and bone resorption (affecting sections of a bone or bones). The former he believes is due to disuse, inflammation or traumatism; the latter, to pressure, neurotrophic disturbances or cellular activity.

Page[6] believes that resorption is due to lack of stimulation, irritation or systemic conditions. He has noted that, in numerous cases, when considerable resorption occurred, irregularities in occlusion as a means of retarding the development of the condition. He realizes that balanced occlusion is the solution of but one phase of the problem and that the problem of bone atrophy must be solved if prosthesis is to advance with other branches of dental science.

Jackson[8,9] has called attention to the fact that progressive atrophy can in many cases be predetermined by the use of the roentgenograms. He has followed

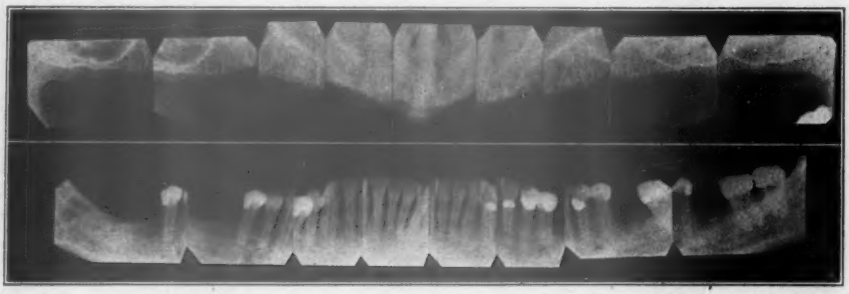

Fig. 5 (Case 2).—Slight osteoporosis.

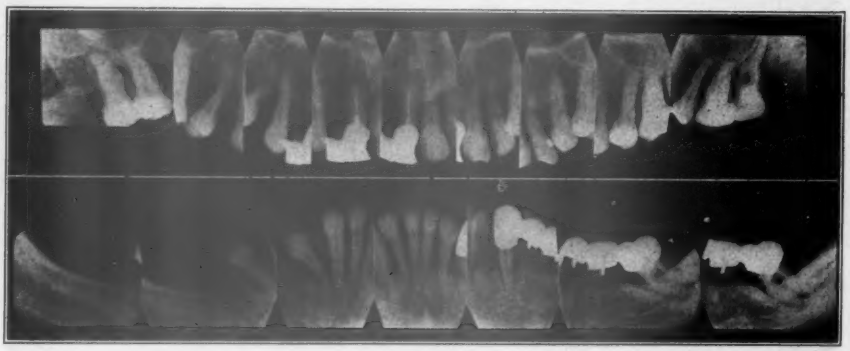

Fig. 6 (Case 3).—Osteoporosis.

calcium-phosphorus balance were also found. He gives a number of case histories in which dietary adjustment, endocrine correction and a removal of infection have resulted in stopping the resorption or at least decreasing it.

Wright[7] is of the opinion that bone resorption is primarily due to traumatic pressure, but he suggests only balanced a number of cases to show that atrophy is, to a degree at least, directly due to conditions which may be noted in the osseous structure.

McKevitt[10,11] calls attention to the appearance of bone in roentgenograms, pointing out that failure of bone to offer interference to the passage of the roentgen rays indicates a structure which will

later present atrophic conditions; whereas bone which offers considerable interference to the rays should prove favorable as a foundation for artificial dentures. He is of the opinion that the presence or the lack of mineral salts in the osseous structure, which would normally offer resistance to the passage of roentgen rays as well as resistance to atrophic changes, may be traced to hormonal dysfunction of the parathyroids and vitamin deficiencies. His views are based entirely upon clinical and roentgenographic interpretations and the relation between the roentgenographic evidence and the metabolic background is assumed as other investigators have reported the connection between bone disease, endocrine disorders and dietary deficiencies.

It may be seen that there are but few reports, such as those presented by McKevitt, Page and Jackson, that have attempted to analyze the systemic background of patients complaining of severe alveolar atrophy. It is probable, as these reports indicate, that alveolar atrophy is but a local manifestation of general systemic disturbances which are admitted to be outside the realm of dental science. If such is the case, we as a profession

Fig. 7 (Case 4).—Osteoporosis of lower jaw, prior to final extraction.

Fig. 8 (Case 4).—Appearance of jaws one year after extraction.

must be prepared to recognize these local manifestations, that we may direct the patient to a physician for general systemic diagnosis and treatment. This may seem out of place to men both in dentistry and in medicine, but, after all, most patients require and seek dental service much more frequently than they do medical service. We may therefore see and recognize local symptoms of a condition which the physician would not

planned. At that time, as I was connected with the dental school of the University of California, I was able to enlist the aid of the Department of Dental Medicine in securing the necessary laboratory data. Hermann Becks kindly provided me with the basal-metabolism data which I have incorporated in this paper. Nina Simmonds conducted a series of dietary surveys of my group of patients and to her is due the credit for the

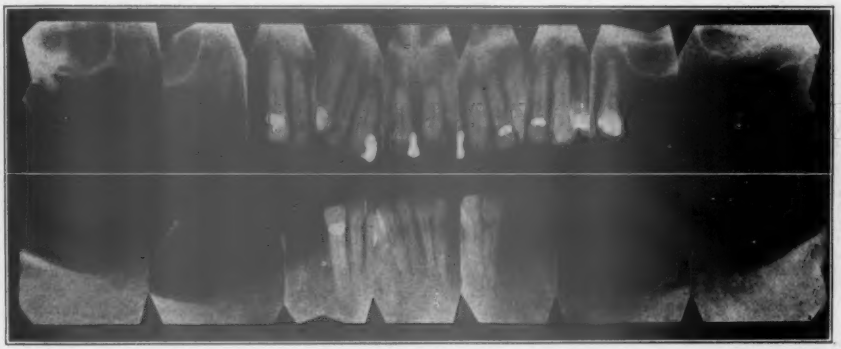

Fig. 9 (Case 5).—Osteoporosis of upper jaw.

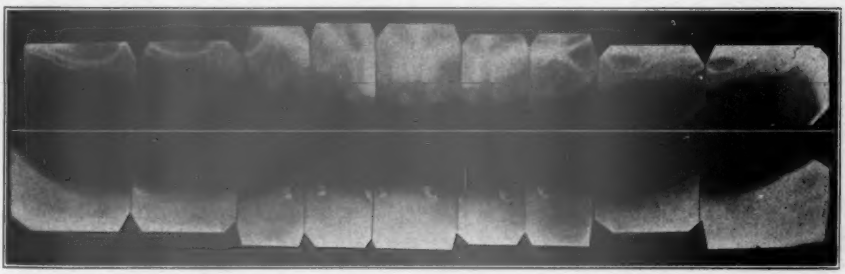

Fig. 10 (Case 5).—Presence of surgical paste in lower alveoli.

be called upon to correct until a number of years had passed, when the opportunity to effect a cure may no longer exist.

As practically all of the literature on this subject has been based upon clinical evidence, several years ago I undertook a more comprehensive study of a group of selected cases. Roentgenographic, dietary and basal metabolic studies were

dietary reports. She is presenting more details covering this same group of patients in a companion paper.

In order that technical contributory factors might be reduced to a minimum, the cases were selected not from the college clinic, but from my own practice. All of the patients are now wearing dentures constructed on adjustable articulators. The group selected numbered

fifteen to start with, but owing to uncontrollable conditions dwindled to nine by the time the data were finally assembled. I realize that nothing definite can be determined from nine cases or even ninety cases. However, I do believe the data presented are indicative of a problem which should be studied further and which must be considered if denture prosthesis is to progress along lines most satisfactory to patient and dentist.

The regeneration of bone following the extraction of several teeth is almost perfect, the cortical plates being smooth and dense.

Figure 2 is a reproduction of a roentgenogram of an extreme case of osteoporosis. The sparse distribution of the bone trabeculae is evident in both upper and lower jaws. The area where teeth have been extracted shows little or no regeneration.

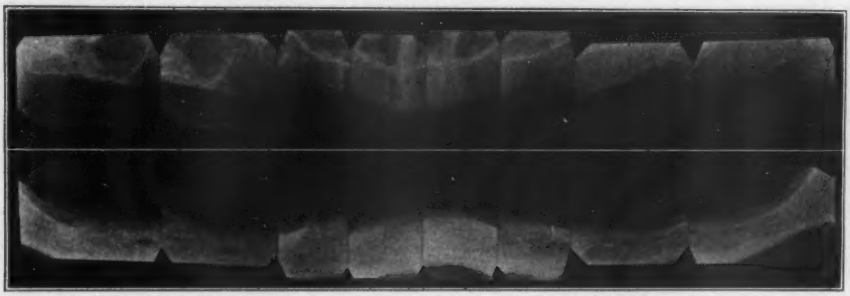

Fig. 11 (Case 6).—Osteoporosis.

Fig. 12 (Case 7).—Osteoporosis.

The accompanying illustrations, of the selected cases, show the differences between roentgenograms of these cases and of normal bone.

Figure 1* is a reproduction of a roentgenogram of normal bone. The even distribution of trabeculae is to be noted.

*Photographic reproductions of the roentgenograms are the work of Fred Schubert, University of California.

In Case 1, Figure 3, osteoporosis was evident in both upper and lower jaws. The teeth were extracted in June 1932. First dentures were placed immediately. Second dentures were constructed in September 1932 and were rebuilt in September 1933. The upper denture was rebased September 1935.

Figure 4 shows roentgenograms taken in September 1935. The condition of the

cortical plate and the general lack of bone regeneration are of interest. The vertical dimension had been reduced about 6 mm. in three years. The gums were tender and frequent adjustments of occlusion were required. The patient was given laboratory and dietary examinations and was placed on treatment for a year. The third set of dentures was constructed in July 1936.

materials required for her thyroid and dietary program for about two weeks. By the end of that time, all of the old symptoms of mouth distress were manifested. Shortly after the patient was able to resume treatment, the local oral symptoms disappeared and to date they have not returned.

In Case 2, the roentgenographic diagnosis was osteoporosis. (Fig. 5.) The

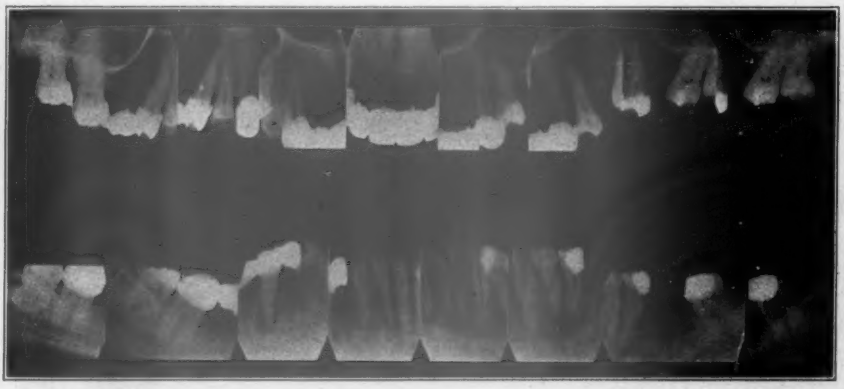

Fig. 13 (Case 8).—Osteoporosis; prior to final extraction.

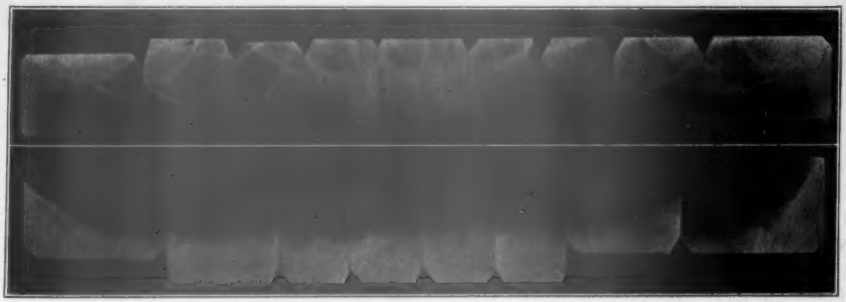

Fig. 14 (Case 8).—Osteoporosis, one year after extraction.

The patient has been on thyroid therapy and a well-balanced diet for the past three years. Little attention other than very slight peripheral adjustments has been required since the construction of the third set of dentures in 1936. During the summer of 1937, while on a vacation, the patient was unable to obtain the

patient was referred for laboratory and dietary examinations. Hyperthyroidism and dietary deficiencies were noted and corrective treatment was instituted. The teeth were extracted in August 1935. First dentures were placed immediately; second dentures were constructed in July 1936. This case has been under super-

vision and has required but minor adjustments to date.

Case 3 (Fig. 6) was diagnosed as osteoporosis. The patient was referred for laboratory and dietary examinations. Hypothyroidism and serious dietary deficiencies were noted. Treatment was advised, but was not followed. The teeth were removed in December 1935 and January 1936. First dentures were placed in March 1936. Further denture service was refused unless the patient would agree faithfully to follow the prescribed treatment. Second dentures have since been made by another dentist, but are now unsatisfactory.

Case 4 (Fig. 7) was diagnosed from roentgenograms as osteoporosis of the lower ridge. Laboratory and dietary examinations were made. Slight hypothyroidism and gross dietary deficiencies were noted. Dietary adjustments were planned. The teeth were extracted in March 1935. First dentures were placed immediately. Second dentures were constructed in August 1935. Considerable reduction of the vertical dimension occurred and a third set of dentures was constructed in June 1936, the patient retaining the second set as duplicates. The lower denture was rebuilt with centric relation in a slightly advanced position in July 1937. No other attention has been required since that time. Figure 8 shows roentgenograms taken in June 1936.

Case 5 (Fig. 9) was diagnosed as slight osteoporosis of the upper jaw. Uneven distribution of trabeculae in the areas where the teeth had been extracted indicated inadequate regeneration. The patient was referred for laboratory and dietary examinations. The vitamin intake was found to be inadequate and corrections were made. The remaining lower teeth were extracted in June 1934. The lower denture was placed immediately. The remaining upper teeth were removed in August 1934, and the first denture was placed immediately. Second dentures were constructed in September 1935. Few adjustments have been required, none in the last two years. The lower denture now requires rebasing, but as yet the patient has not been inconvenienced to the point where she is willing to go without the dentures for the short time required for rebuilding.

Fig. 15 (Case 9).—Osteoporosis of lower jaw.

Figure 10 shows roentgenograms taken in January 1936. The foreign bodies noted are particles of surgical paste which entered the alveoli upon the insertion of the denture immediately after removal of the teeth. These particles were removed. The irregularity of the cortical plate is evident, with the slight supporting structure that was formed in the

lower posterior regions prior to the insertion of dentures. Added relief of the denture over the ridge crest was made in these areas.

Case 6 (Fig. 11) was diagnosed as osteoporosis. The patient was given laboratory and dietary examinations. Reports indicate a slight glandular deficiency and gross dietary irregularities. The patient had a diabetic history during early middle age, but there were no present indications of diabetes in the laboratory tests. All the lower teeth and upper posterior teeth were missing. The patient was wearing a partial upper and a full lower denture with a heavy tin base. Several lower dentures had been made since the teeth were removed in January 1934. The remaining upper teeth were removed in January 1935 to reduce traumatization of the osteoporotic lower ridge. First dentures or splints were placed immediately. Second dentures were constructed in May 1935. The patient has been more comfortable than before, but has required frequent occlusal adjustments and finds it desirable to remove the dentures in order to prevent soreness. The age of the patient (71 years) and a long history of dietary inadequacies would more or less preclude the hope of further improvement.

Case 7 (Fig. 12) was diagnosed as osteoporosis. All the lower and the upper posterior teeth were missing. The patient was attempting to wear a full lower and partial upper denture, which were apparently constructed upon a one-dimensional articulator, and reported continual distress from the time of the insertion of the dentures. Laboratory examinations were made, and dietary deficiencies were noted and corrections suggested. The remaining upper teeth were removed in November 1935 to reduce traumatization of the lower ridge, which at this time was almost entirely resorbed. An upper splint was inserted immediately. Second dentures were constructed in September 1936. Infrequent peripheral adjustments have been required during the past three years. This case, in general, has been exceptionally satisfactory from the standpoint of the patient, primarily, I believe, owing to the improved denture service. Trauma has

SUMMARY

PATIENT	SEX	AGE	BASAL META.	DIETARY SUMMARY	ROENTGENOGRAPHIC DIAGNOSIS	RESULTS AS OF 1938
1 H	FEMALE	39	-18.1 -20.9	MINERALS LOW VITAMINS LOW	UPPER-OSTEOPOROSIS LOWER-OSTEOPOROSIS POOR REGENERATION-FOLLOWING EXTRACTION	EXCEPTIONALLY FAVORABLE
2 D	FEMALE	34	+2.8 +30.9	VITAMINS LOW	UPPER-OSTEOPOROSIS LOWER-OSTEOPOROSIS	FAVORABLE
3 H'	FEMALE	50	-18.1	MINERALS LOW VITAMINS LOW	UPPER-SOME OSTEOPOROSIS LOWER-OSTEOPOROSIS	CONTINUED ATROPHY
4 S	FEMALE	53	-10.4	MINERALS LOW VITAMINS LOW	UPPER-FAIR OR GOOD LOWER-SOME OSTEOPOROSIS	SLOW IMPROVEMENT
5 C	FEMALE	45	-7.1	VITAMINS LOW	UPPER-FAIR-SLIGHT OSTEOPOROSIS LOWER-FAIR-FOREIGN BODIES IN ALVEOLI	FAVORABLE
6 W	FEMALE	71	-11.2	VITAMINS LOW	UPPER OSTEOPOROSIS LOWER-OSTEOPOROSIS	SOME IMPROVEMENT
7 N	FEMALE	52	-0.5	MINERALS LOW VITAMINS LOW	UPPER OSTEOPOROSIS LOWER-OSTEOPOROSIS	FAVORABLE
8 K	FEMALE	39	+18.8	VITAMINS LOW	UPPER-OSTEOPOROSIS LOWER-OSTEOPOROSIS	FAVORABLE
9 L	MALE	50	-19.7 -17.8	MINERALS LOW VITAMINS LOW	UPPER-FAIR LOWER-OSTEOPOROSIS	DECIDED IMPROVEMENT

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been reduced and the occlusion has been balanced.

Case 8 (Figs. 13 and 14) was diagnosed as osteoporotic. The patient was referred for a laboratory and dietary survey. Reports indicated glandular and dietary deficiencies. Corrective treatment was instituted. The teeth were removed and immediate dentures placed in April 1935. Second dentures were constructed in December 1935. The lower denture was rebased in October 1936. Several adjustments have been required in the last two years, but, on the whole, results have been quite satisfactory.

Case 9 (Fig. 15) was diagnosed as osteoporosis of the lower jaw. The teeth had been extracted in September 1931. First dentures were constructed in October 1931. Considerable loss of denture space was experienced, about 5 mm. having been lost by July 1934. Dentures were rebuilt to the original facial dimension in July 1934. Observations during the following year indicated that further loss of the vertical dimension could be expected unless the cause could be ascertained and corrective measures be instituted. It should be noted that the edentulous ridge and the face form of this patient were of the square type. The osseous structure was heavy and well formed. This would probably account for gradual atrophy of the ridges with a minimum amount of discomfort.

The patient was referred for laboratory and dietary survey in August 1935. Reports indicated both glandular and dietary deficiencies. Corrective treatment was instituted under medical supervision. Up to date, the loss of facial dimension has been slight, and only one peripheral adjustment has been required in the past three years.

The accompanying table summarizes the laboratory, dietary and roentgenographic findings of the cases presented, with the clinical status of the patient at the present time.

These few data seem to suggest that:

1. Mineral or vitamin deficiencies either alone or in conjunction with glandular imbalance result in osseous atrophy under dentures.

2. Patients having corrective treatments generally show marked improvement.

3. Patients who have glandular or dietary deficiencies and do not follow corrective measures or are well advanced in years may expect continued or increasing discomfort from progressive atrophy.

4. Well-balanced dentures are doubtless advantageous in reducing trauma, which seems to be a factor in causing osteoporosis.

5. The data presented check with the findings of other investigators.[2, 4, 5, 6, 7, 8, 9]

6. Successful denture service is not solely a problem of the technical skill of the dentist, important as this undoubtedly is.

CONCLUSION

Up to the present time, insufficient data have been accumulated and from too few sources to make possible exact or conclusive statements as to the causes and treatment of progressive bone atrophy under artificial dentures.

The facts available seem to indicate that treatment other than technical or mechanical is required. It would seem desirable that the prosthodontist know more than the technical phases of his art and science if satisfactory service is to be rendered to an increasingly large group of edentulous patients. Both physicians and dentists, rather than dental technicians, will have to contribute to the treatment of many such patients, if those who have serious dental problems are to avoid having their problems multiplied.

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THE DIETARY PHASE OF DENTURE PROSTHESIS

By Nina Simmonds, Sc.D., San Francisco, Calif.

RESEARCH on the relation of diet to dental disorders has been very difficult, owing for the most part to the fact that no small laboratory animal is available the dietary requirements and dental apparatus of which closely resemble those of man. Nevertheless, progress has been made during the past twenty years or so, as is evidenced by the papers in the dental journals of this country and abroad.

Leaders in the various branches of dental and medical practice are cognizant of the fact that both a patient's ability to secure a highly satisfactory diet and his body's ability to utilize the various dietary factors are of great importance to his welfare regardless of the nature of his physical disabilities.

From the University of California College of Dentistry.

Read before the Section on Partial Denture Prosthesis at the Eightieth Annual Session of the American Dental Association, St. Louis, Mo., October 26, 1938.

Although our interest at the present moment is concerned primarily with diet in its relation to denture prosthesis, it must be remembered that nutrition of any one portion of the body cannot be considered except as a part of the nutrition of the whole. It is true that certain organs and tissues require different proportions of the several food constituents, and a shortage of any of these apparently has a more pronounced effect upon some tissues than upon others. For example, a shortage of iodine is undoubtedly one of the factors in simple goiter; a shortage of iron is one of the causes of secondary anemia; a disproportion of calcium, phosphorus and vitamin D plays a rôle in the etiology of rickets, and a diet low in vitamin C brings about changes in the capillaries resulting in hemorrhages: bleeding of the gums is one of the characteristics of scurvy. But a shortage of any of these dietary essentials manifests itself in ways other than those cited.

Boyle, who has been working on the rôle of vitamin C in dental disorders, has recently summarized the information extant regarding dietary deficiencies and diffuse alveolar atrophy.[1]

The rôle the endocrine glands play in health and disease cannot be discussed here, but it should be emphasized that endocrine balance is one of the fundamentals of good health. I shall confine my remarks to the relation of nutrition to prosthetics. I do not wish to convey the impression that I believe a highly satisfactory diet is a panacea for all difficulties encountered in prosthesis. Having read papers by House,[2] Smedley,[3] B. B. McCollum,[4] Little,[5] Paterson,[6] Young,[7] Page,[8] Stansbery[9] and MacMillan,[10] I have some conception of the magnitude of prosthetic problems outside the realm of nutrition.

As an introduction to nutrition problems of prosthetic patients, the following quotation from a paper by Dr. Smedley, of Denver, entitled "Alveolar Bone in Relation to Denture Prosthesis," is apropos[3]:

> Why is it that there is such a marked variation in the alveolar support for dentures in different mouths? We frequently hear it said that if a patient is going to wear dentures, the earlier in life he must do so, the better, as the ridges are stronger in youth, and if teeth are allowed to remain until they are lost by pyorrhea, there will inevitably be no adequate foundation for dentures.
>
> This is a logical-sounding statement and conclusion, but it is not necessarily borne out by the facts. In some of the most extreme cases of resorption of the jaws . . . the teeth were extracted when the patients were quite young, and the ridges that were prominent in the beginning have undergone resorption and melted away under full dentures. On the other hand, I have seen mouths . . . in which the teeth were all lost by pyorrhea, and still the patients have very satisfactory ridges for denture support. What is the answer? I believe that there are two factors in this problem which are more important than the age of the patient and the question as to whether the teeth were lost from pyorrhea. They are bone mineralization and denture imbalance or trauma.
>
> Given a jaw with dense mineralized bone,

TABLE 1.—SOME COMMON FOODS CONTAINING IMPORTANT FOOD ELEMENTS AND VITAMINS*

Protein and Phosphorus Foods	Calcium Foods	Foods Rich in Vitamins			
		A	B	C	D
Eggs	Milk	Butter	Whole grain cereals and breads	Grapefruit	Tuna
Milk	Cheese	Carrots		Oranges	Salmon
Meats	Cauliflower	Egg yolk		Lemons	Herring
Poultry	Beans	Cheese	Wheat germ	Tomatoes	Halibut
Cheese	Almonds	Milk	Yeast and yeast tablets	Tomato juice	Sardines
Fish and sea foods		Liver		Raw cabbage	(Fish liver oils contain varying amounts of vitamins A and D)
Legumes		Kidney	(All fruits and vegetables and meats contain some vitamin B)	Green pepper	
Nuts		Spinach (greens)		(Fruits and vegetables contain varying amounts of vitamin C)	
			Milk, eggs		
			Lean pork		

*Among other dietary factors, nearly all, if not all, foods contain small amounts of protein, calcium and phosphorus. Nearly all fruits contain small amounts of vitamin A; green and yellow vegetables are usually good sources of it.

If the diet contains adequate amounts of protein, calcium, phosphorus and iron and vitamins A, B, C and D from foods, there will be no shortage of vitamins E and G or less well-known dietary factors. There are excellent preparations on the market which contain all of the vitamins, but one should know what these preparations do not contain as well as what they contain.

no matter what the age of the patient, and we need expect no difficulty with any type of partial or full dentures the wearing of which does not produce severe malocclusion and trauma. On the other hand, with . . . bone, which is deficient in minerals, there can be nothing but dissatisfaction with tissue-borne artificial dentures, whether full or partial, no matter at what age the natural teeth were extracted.

TABLE 2.—AMOUNTS OF COMMON FOODS FURNISHING CALCIUM REQUIRED DAILY

	Pounds
Milk (3-4 glasses)	1.5
Cheese	¼
Apples (50 large)	20.2
Beans (string)	3.2
Beets	9.4
Bread, white	7.3
Bread, brown	5.5
Butter	11.0
Cabbage	3.9
Carrots	3.7
Cauliflower	1.5
Celery	2.7
Corn (green)	27.5
Eggs (20)	2.6
Grapefruit	7.3
Grapes	12.0
Lentils	1.8
Oatmeal	2.3
Oranges	4.9
Pears	12.9
Peas (green)	9.9
Potatoes	17.0
Rice	17.6
Tomatoes	11.0
Watermelon	26.4
Meat (lean beef)	26.4
Fish	14.7
Water (Catskill and Groton)	100 quarts

Dr. Smedley does not give any information on the previous or present diets of the patients that he discusses. This information would be of great interest owing to the relation of diet to bone formation. From my own studies on diet and its relation to dental and medical disorders, I question whether the patients referred to by Dr. Smedley had had an optimum dietary régime. The so-called average diet leaves much to be desired as far as optimum nutrition is concerned. It is now recognized by all persons interested in nutrition that the mere fact that a person is not suffering from a full-blown deficiency disease is no indication that his diet is optimum from the nutrition standpoint. The details for taking a nutrition history were published in the June (1938) issue of THE JOURNAL.[11]

I took the nutrition histories of the patients that Dr. George A. Hughes has discussed in the preceding paper in this issue of THE JOURNAL. But before presenting their condensed histories, I shall give a summary of the principal dietary properties of the most common foods, as I shall refer to these foods and what they contribute to the diet when I discuss the nutrition histories of these patients.

Table 1 indicates that foods rich in protein are likewise rich in phosphorus. Milk and cheese are listed not only as phosphorus and protein foods, but also as calcium rich foods. The solution of nutrition problems is in great measure dependent on the proper selection of foods and only to a limited degree on the employment of calcium salts and vitamin preparations.[12]

Table 2, taken from a paper by Dr. Alice R. Bernheim on calcium content of foods, gives a list of some of the common foods, the quantity of each as indicated containing the calcium requirement of the adult for one day: 0.70 to 1.0 gm. of calcium.[13]

It is obvious from Table 2 that unless milk or cheese is included in our diet, it is exceedingly difficult to satisfy the calcium need, since inordinately large amounts of other foods and water would have to be ingested, quantities far beyond the capacity of the normal individual. Beans are an important source of calcium, phosphorus and protein in the oriental and Mexican diets. The very common practice of the Chi-

nese of cooking spare-ribs in a sweet-sour sauce dissolves much of the calcium from these bones, which thus becomes an added source of this element in their diet. A discussion of racial and regional food habits would take us too far afield from the subject at hand, but each race without a dairy industry has these fish. I do not hesitate to say that the average diet is too low in this dietary essential for optimum well-being. The amount derived from sunshine is so variable that it is impossible to estimate its value as a source of vitamin D under modern conditions of living.

TABLE 3.—DIETARY SUMMARY OF CASES

	Year of Birth	Place of Birth	Nutrition Status to About Age 20	Nutrition Status from About Age 20 to Present Time
Mrs. C	1890	Illinois	Average	Better than average food set-up, but undernourished owing to low food consumption
First child (5 children in family)				
Mrs. W	1901	Central California	Below average	Better than average food set-up, but rather low food consumption; not so low as that of Mrs. C
Fourth child (4 children in family). Father died when she was 6 months of age. Food problem an economic one.				
Miss H	1895	Central California	Average up to age 6, then below	Below average, especially protein, calcium and phosphorus foods; vitamin C average or above; no information or very little on food values
Sister of Mrs. W Second child (4 in family)				
Mrs. FH	1885	England	Below average	Below average, owing to low food consumption in the midst of plenty of food; one of the poorest diets in series; one of those cases in which emotional problems enter
(Tenth child)				
Mrs. K*	1896	San Francisco	Above average	Above average; very fond of cheese
Third child (3 in family) Unquestionably the best nutrition set-up of the series.				
Mrs. N	1885	Iowa	Below average	Below average owing to low food consumption; many dislikes among foods
Fifth child (8 children in family)				
Mrs. S	1882	New Jersey	Above average	Above average up to 1920, financial reverses, great mental and nervous strain, low food consumption since 1920.
(Eleventh child)				

*Mrs. K not only had the best food habits in the series, but also was an out-of-doors person; hence she derived more vitamin D from sunshine than any of the others in the series.

solved its calcium problem; otherwise, it would have become extinct.

Liberal amounts of vitamins A, B and C are readily available from foods, but experience has shown that many diets are low not only in these factors, but also in vitamin D. Salmon, tuna, halibut, herring and sardines are good sources of vitamin D, but the average diet contains only small amounts of

In a recent article on "The Use of Vitamin D Preparations in the Prevention and Treatment of Disease," Dr. E. A. Park, professor of pediatrics in the Johns Hopkins Medical School, states: "I want to point out that it would be of undoubted benefit if the habit of taking vitamin D in some form were universal. If our food were like that of the Eskimo, with vitamin D a

regular ingredient, rickets would disappear almost entirely, the state of the teeth might undergo improvement and the level of the health of many persons might be raised."[14] The importance of this factor in calcium and phosphorus metabolism is too well known to need further discussion.

A brief summary of the nutrition histories of Dr. Hughes' patients appears in Table 3.

Mrs. C was born in March 1890 in Illinois. She was the first child in a family of five. She lived in the middle west until she was 22 years of age. The family had a small garden in summer, but their main raw food in winter was apples. In passing, it may be said that apples and canned tomatoes were the main sources of vitamin C during the winter months for many of us who were born and reared in the middle west. Mrs. C does not have a record of severe illness as a small child, but apparently was not robust. She was married at the age of 26 and has lived in the west since then. She looked to be older than her stated age. She said she had been chronically tired for many years. Part of her fatigue and early aging may have been due to a low food consumption, which means not only a low protein intake, but also only fair amounts of most other dietary factors. This case represents undernutrition rather than malnutrition; that is, the small amount of food taken was fairly well balanced. In other words, with the character of food she ate, if the patient had had a good appetite, she should have had better bone structure. With an excellent diet and plenty of rest, her general health would undoubtedly have been much better.

The following comments which Dr. McCollum and I have made in the fourth edition of "The Newer Knowledge of Nutrition"[15] probably apply not only to the early nutrition history of Mrs. C, but also to many of your own patients in the older age groups:

Poor physical condition is by no means restricted to recent years in this country, nor is it necessarily due to modern conditions of city living. Many will recall how our grandmothers insisted upon the frequent treatment of sulphur and molasses, the periodical dosing with bitters, and the efficacy of sassafras tea in the spring as a means of "thinning the blood," which was supposed to have become "impure" and "thick" during the winter. Among our pioneer ancestors the idea was generally accepted that there was need for a "spring medicine" of some kind. This belief rested on common experience. In the early settlement of many of the states the people suffered great hardships. With little capital and no food reserve their winter diet was generally very simple and monotonous. There is good reason to believe that it was chemically unsatisfactory for the maintenance of health. After a period of several months during each succeeding winter they felt "run down." The almanacs, which were circulated by patent medicine concerns, discussed the prevalence of "that tired feeling" in the spring. They convinced people that they needed a course of treatment with sarsaparilla or a "spring tonic" or other "blood purifier." The use of these tonics was so universal that it established the belief that winter was an unhealthful season.

The vendor of "spring medicines" had a powerful ally in the spring diet of his customers. With the coming of warm weather, various "greens" were available and were eagerly consumed. Clover, sorrel, wild onions and dandelions grew in abundance on the prairies and were added promptly to the food supply. The cows, which had been dry all winter owing to their starved condition, became fresh, and milk was available. The few hens in the barnyard added worms, insects and tender grass to their diet and began to lay eggs. The garden furnished an abundance of fresh vegetables, which were eaten with a relish that can be appreciated only by one who has for a period been semi-starved. The "tired feeling" disappeared about this time, but the regular spring remedies had been taken and the beneficial results of better diet were wrongly attributed to the efficacy of drugs.

The practical application of the results

of research in nutrition during the past twenty-five years have been discussed elsewhere.[12]

The early histories of the next two patients were not unlike that of Mrs. C, even though they were born in central California. Miss H was born in October 1895; Mrs. W, her sister, in May 1901. Owing to the death of their father, when the younger daughter (Mrs. W) was only 6 months of age, the mother had to take over the support of the four children. As nutrition is in part an economic problem, the children did not have the liberal amounts of milk, eggs, meat, fruit and vegetables which they undoubtedly would have had if their father had lived.

Mrs. W married at the age of 24. She had been married twelve years and had two children, aged 7 and 9, at the time the history was taken. She was a homemaker whose husband had had a steady income, which means that she had had a much better diet since her marriage than she had had when younger. This, in turn, tended to rebuild her health. Since her height is only 5 feet 1 inch, she did not have a large frame to be rebuilt. This is an important point in the consideration of nutrition and bone rebuilding. As pointed out by Dr. Hughes, her bone structure is much better than that of her sister, Miss H.

Miss H is a teacher. She has prepared her own meals for many years, and owing to lack of information on the dietary properties of foods, she did not know what she was doing to her health when she ate "lots of fruits and vegetables" but took little milk, meat and eggs. Like her sister, she is of slight body build, so her bone structure is not so poor as it unquestionably would have been if her height had been about 5 feet 8 inches. Mrs. W and Miss H have given excellent cooperation, with the results which Dr. Hughes has presented.

One of the most interesting histories and also one of the most tragic is that of Mrs. FH. She was born in Manchester, England in August 1885, the tenth child in a family of moderate income. Owing to the death of her father when she was 2 years of age, the family had had a financial struggle. It cannot be stressed too often that nutrition is in part an economic problem; but it is also an educational problem.

Owing to a dislike of the foods that her mother cooked, Mrs. FH recalled that from an early age, her food consumption had been low. Even after her marriage, when she could have cooked what she wanted, and an abundance of milk, eggs, cheese, meat, fruits and vegetables and whole grain cereals were available, she continued to eat too sparingly to rebuild her body. In other words, she did not form good food habits as a child and did not change them when she grew older.

Factors other than nutrition may of course have played a rôle in her condition, but she did have the poorest nutrition history of the series and would constitute a poor risk for any dental work.

Mrs. K was born in San Francisco in May 1896. She was the third child in a family of three. Her entire history is in marked contrast to that of Mrs. FH. Mrs. K was born into a family with a zest for living which she has never lost. She has had good health and good food, but probably too high an intake of sweets all her life to have enabled her to keep free from tooth decay. She had rather extensive decay prior to the time her teeth were taken out. She has been an out-of-doors person all her life. Sunshine has been a real source of vitamin D in her case. Although not fond of milk, she likes cheese and eats it regularly. When questioned closely as to how much cheese was eaten and how regularly, she cited the following incident which convinced me that she is fond of cheese: a week-end guest had recently brought her a box of assorted cheeses.

Mrs. K and Mrs. FH represent two extremes in patients. Dentists who practice in the field of prosthesis would have less difficulty if all patients were like Mrs. K; at least, from the nutrition standpoint, they would have more in their favor. Mrs. K's diet could not be rated excellent in all dietary essentials, but the intake of calcium, phosphorus and vitamins C and D, those factors especially concerned with bone growth, would rate good to excellent.

In many ways, the dietary history of Mrs. N is like that of Mrs. C. Undernutrition due to low food consumption characterized her history rather than malnutrition. Her bone structure was not unlike that of Mrs. C.

Mrs. S was born near Atlantic City, N. J., in August 1882. Unlike Mrs. FH, who was born about the same time into a family of modest means, Mrs. S was born into a family where food was abundant and home life very happy. In other words, these two patients had very different nutrition set-ups during their first thirty-five years. As previously stated, Mrs. FH never overcame her poor food habits and her bone structure is poor. Mrs. S made good bone. From the time of birth up to 1920, she had very good food habits. An abundance of milk, eggs, meat, cereals, cheese, fruit and vegetables formed the basis of her diet. Financial reverses came in 1920. Since that time, she has been under great mental and emotional strain. Her food consumption has been low with the exception of orange juice, which contains vitamin C. Mrs. S should not from the nutritional standpoint and does not according to roentgenograms have the exceedingly poor bone which Mrs. FH has. However, owing to the constant drain on the skeleton resulting from poor food habits practiced for the past fifteen to eighteen years, unless Mrs. S has made the changes we suggested, she will in time have very poor bone. Because of the good skeleton she built during the first thirty-nine years of her life, she has had a greater reserve to draw upon than Mrs. FH had. The skeleton is a storehouse for calcium just as the liver is a storehouse for glycogen, but, as in every storehouse, the supply must be replenished or exhaustion results.

Mrs. S offers an excellent example of a point made in the nutrition history; namely, certain patients have two or more periods in their lives from a nutrition standpoint.[11] For example, period 1, from birth to age 38 (1882-1920), Mrs. S had an exceptionally satisfactory diet; whereas, in period 2, age 38 to 53 (1920-1935 at the time the history was taken), she had had an inadequate diet owing to low food consumption.

Further details on these patients are unnecessary here, but it should be mentioned that from the nutrition standpoint, Dr. Hughes really had only one patient in the series who could be considered a good risk for denture service—Mrs. K. Mrs. W would rank second. Needless to say, all the patients expected equally good results from their dentures, and they undoubtedly have believed it to be Dr. Hughes' fault that they have had difficulty with them.

Several dentists and physicians have asked me whether patients are honest when questioned about their food habits. From my experience with more than 600 persons during the past five years, I believe that persons do not intend to falsify their nutrition histories or their menus when asked to keep a record of them. However, one patient may tell you what he really thinks his food habits are, and another what he intends them to be. In either case, when he is confronted with his two-week food intake record, and questioned closely but tactfully, it becomes apparent to him that he has confused what he would like to do with what he has done. For example, a person may state during the course of history taking that he is very fond of fresh fruits and fresh vegetables and he is es-

pecially fond of orange juice or tomato juice. His menus show a coffee and "snail" or coffee and doughnut breakfast approximately six mornings a week. A small glass (4 ounces) of orange juice is taken on Sunday mornings. The menus may or may not show other foods which are good sources of vitamin C. The end-result may be that the diet is low in vitamin C, even though the patient is really fond of vitamin C rich foods. Convenience and habit are two factors which have to be taken into consideration in nutrition work. Further details on the technic of taking a nutrition history are given elsewhere.[11]

It is fully recognized that there are factors other than diet in dental disorders, such as heredity, lack of mouth hygiene, lack of professional care, poor function, endocrine imbalance, poor general health, systemic disorders and developmental defects. From the nutrition studies on Dr. Hughes' patients, and from studies made in orthodontic, periodontic and caries cases, it appears that if a dentist knew the economic backgrounds of his patients as well as their physical and mental health records, unquestionably he would have a basis for understanding why certain patients do not respond to treatment which proves satisfactory for other patients. From a practical standpoint, if the finished work is not the success that it was hoped to be, could not the question be asked "In the last analysis, was the patient ever a good dental risk?" In certain instances, has not the dentist been accused of doing poor work when, in reality, he has done his best, but the patient was exceedingly poor material upon which to work? This would apply whether the dental attention given is in the field of operative dentistry, orthodontics or restorations.

Undoubtedly, there are at least two questions which this discussion has raised: 1. Is it possible to rebuild bone in every patient regardless of age? 2. How long does it take to rebuild bone in a patient?

The following statements by Dr. J. C. Drummond, professor of biochemistry, University College, London, in an excellent critical review on nutrition, offer some light on the first question: "In investigations on man one is dealing with individuals who perhaps for many years have suffered deficiency of vitamins and minerals and it cannot reasonably be expected that the effects of such chronic malnourishment will be dispersed by a few weeks' treatment with the factor concerned."[16] Dr. Drummond should have said "factors" instead of "factor" concerned, because, unquestionably, few persons have taken diets adequate in all but a single factor.

It is, of course, fully understood that adequate nutrition can no more stimulate the jaw to grow a new ridge when the original ridge has been removed surgically or has been completely resorbed than it could cause a finger to grow a new joint to replace one that has been amputated. Owing to the intense interest in nutrition which has resulted from the spectacular researches on this subject, at times perspective is lost as to what it is possible to accomplish with a highly satisfactory diet and what is impossible.

No answers which would apply to all persons can be given to either of the foregoing questions; but without doubt it may be said that all persons are not capable of the same degree of bone regeneration. Age, endocrine imbalance, previous nutrition and health and the condition of the digestive tract are only a few of the factors to be considered when bone regeneration is needed. Dr. M. G. Vorhaus, a physician interested in gastrointestinal disorders, has recently published a paper entitled "Vitamins in Relation to Gastro-Intestinal Diseases."[17] Since the prosthodontist works primarily with the middle and older age groups, this paper should be of interest to him. Owing to the frequency of digestive and

related disorders in the older age group, all dentists should be aware that at times the diet problem is outside the realm of normal nutrition and becomes a problem in diet and disease, and hence falls into the medical field. No unpleasantness should arise between physician and dentist over the dietary problems of patients, since all well-informed physicians recognize the importance of diet in medicine.

As this paper is concerned only with the dietary problems in denture prosthesis, factors other than diet which play a rôle in bone regeneration, such as the endocrine system, will not be considered. Page has discussed the necessity for endocrine treatment in successful prosthesis,[8] but it would have to be granted that valuable as the endocrine products are in medicine, they are not panaceas for the problems of the prosthodontist. The following statement credited to Lincoln is apropos: "I am not bound to succeed by any degree of success that you or any man may set up for me, but I am bound to succeed to that degree of success of which I am capable." In other words, does not each patient have to be considered as an individual and his past health and nutrition record be taken into consideration in determining "the degree of success of which he is capable"? Is not the problem presented to the prosthodontist similar to the one presented to the orthodontist except that the latter deals with an age group in which conditions are more favorable for bone rebuilding?[18]

In his studies on the conservation of the edentulous alveolar process, Page[8] is apparently making use of the studies of Drs. Howland and Kramer on the calcium and phosphorus content of the blood serum and its relation to rickets in children and in rats and to the healing of the lesion.[19] Howland and Kramer found that when the product of the calcium content of the blood serum times the phosphorus content was 40 or over, rickets was either in the healing stage or was not present, but if the product was less than 30, rickets was present, and between 30 and 40, healing was taking place.

A nutrition history even in the absence of blood studies will afford any dentist, if he knows the fundamentals of nutrition, a great deal of information concerning the bone structure of a patient. The body must have, among other things, liberal amounts of calcium, phosphorus and vitamins C and D before good bone can be built or maintained. I venture to say that every patient who needs partial or full dentures, regardless of what medical assistance he requires, needs nutrition counsel and has needed it for years.

Up to this point, only the nutritional aspects of denture problems have been discussed, but a suggestion has been made by Dr. Millberry which is pertinent to the thesis presented; namely, that nutrition is a factor in denture prosthesis.

Dr. Millberry says:

> The prosthodontist and the nutritionist are concerned with the maintenance of good alveolar ridges throughout life for the prospective edentulous patient but there are two factors to be considered over which neither may have any control: (1) the dental surgeon may have removed an excessive amount of healthy bone by curettement, process trimming or surgical removal of the teeth or alveolar plates; and (2) the patient has had the responsibility for maintaining a good nutrition program for many years, which he may not have done as is shown in most of the adult patients we have studied.

In other words, what the dental surgeon may have done to the patient and what the patient may have done to himself may prove liabilities for the prosthodontists instead of assets.

In support of the first, Dr. Millberry says:

> During the World War dental surgeons at first were convinced that all fragments of bone as well as all foreign bodies should be removed from the site of facial injury, when

the maxillae and mandible were shattered by gunshot or shrapnel. They soon learned that the removal of islands of healthy bone was not only extremely difficult but highly undesirable since they constituted nuclei where the periosteum could function. The work of Gillett, Pont, and Bennett published in the *British Dental Journal* for 1916 bears on this point.[20]

A paper by MacMillan is also of great interest in this connection.[21]

As I stated earlier in this paper, adequate nutrition can no more stimulate the jaw to grow a new ridge when the original ridge has been removed surgically or has been completely resorbed than it could cause a finger to grow a new joint to replace one that has been amputated. Hence, the surgical treatment of paradentosis causing the loss of septal bone; the surgical removal of infected teeth resulting in the loss of the buccal and labial plates, and the process trimming operation carried on with the idea of preparing nice smooth ridges upon which to place dentures all may tend to the removal of healthy bone, which would defeat the purposes of a nutrition program.

Quoting a verbal statement made by Dr. Millberry:

> In the light of the experiences of the British and French dental surgeons in maxillofacial surgery, and owing to the desire of prosthodontists to restore facial contour and function as nearly to the norm as health and age will permit, should not some thought be given to the prevailing dentosurgical procedures which result in considerable loss of bone? We know that osteoblasts have certain selective abilities, one of them being to institute reparative activity at the site of bone injury immediately after it occurs. We are powerless to inhibit or control this reparative cellular action. Is it possible to direct or aid it by conserving as much healthy bone as possible when the teeth are removed? The cooperation of surgeon, prosthodontist and patient would be a prerequisite to success in such cases.
>
> We must, of course, take cognizance of the senile atrophic changes which occur later in life. Whether anything can combat these is debatable and needs further research.

CONCLUSION

Of what practical value to you as dentists interested in prosthesis is this discussion on nutrition? Since this paper has had to be a rather general one, the pathologic conditions resulting from shortages of the various vitamins could not be given nor a detailed account of the rôle of vitamin D in calcium and phosphorus metabolism be included. Eddy and Dalldorf have written an excellent book on the avitaminoses[22]; Harris has prepared a most readable book on bone growth in health and disease,[23] and Cantrow has discussed calcium and phosphorus metabolism in detail.[24]

Unquestionably, every dentist has patients in the age group of those discussed and also younger ones who are going to need partial and perhaps full dentures within a few years. The human span of life is long. Our slow rate of growth and development protects us from suffering immediately from dietary shortages. It also prevents rapid rebuilding after years of living on an inadequate diet.

Therefore, the practical value of this paper would, it seems, lie in the suggestion that you not only interest your patients in a highly satisfactory diet, but also, if they are not in good health, urge them to seek the care of a physician, so that, if dentures become necessary, the bone will be of good quality and thus provide a satisfactory ridge. The fundamentals of an optimum diet have been published with the nutrition history.[11]

If it is possible to remove less bone, as Dr. Millberry suggests, during the process-trimming operation, nutrition has a better structure upon which to work.

Phillips Brooks said:

> Sad will be the day for any man when he becomes contented with the thoughts he is thinking and the deeds he is doing—when there is not forever beating at the door of

his soul some great desire to do something larger, which he knows he was meant and made to do.

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BRIDGE ABUTMENTS FROM A PRACTICAL AND AN ESTHETIC STANDPOINT

By Carl W. Hoffer, D.D.S., F.A.C.D., Nashville, Tenn.

THE teeth that support fixed bridgework are termed abutment teeth. The retaining or attaching devices are the abutments. These components must withstand the thrust and torque of dynamic occlusion. Thus, any essential discussion of bridgework must deal with abutments first.

My consideration of abutments will be from the practical and esthetic standpoints. The words "practical" and "esthetic" as used herein are intended to convey specific meanings. By "practical," predetermined restorations, possessing sufficient strength and adequate extension for prevention to insure longevity, are meant.

By "esthetic," the replacement of lost tooth structure in a manner pleasing to the eye, yet with a proper consideration of tooth conservation, is meant.

For cast gold abutments, we have (1) inlays, (2) three-quarter crowns and (3) full crowns.

No doubt you have observed misapplication of all types, with resultant failures in many cases. There is a tendency to use one type for a season, and then, for some reason, switch to another. In the future, selection of attachments should be a more deliberate and analytic procedure. By proper diagnoses, past faults may be rectified and better bridges be constructed. Thus, no abutment will be used to the exclusion of others.

Read at the Greater New York Meeting, December 1938.

TRIPODIC PRINCIPLE OF STABILIZATION

All of my attachments have a basic retentive feature in common; namely, the principle of the tripod. I have found that this principle, when carefully followed, simplifies bridge preparations and, at the same time, gives maximum stability and retention.

The tripod principle is applied by placing three pin retention areas or grooves (or combinations of the two) at strategic points not in the same line. When possible, they are placed equidistant from each other. Thus, by joining them, an equilateral triangle would be formed.

Abutments having these three points, when cemented on the abutment teeth, effectively resist torque and thrust. The fixedness gained is comparable to the stabilization that would be obtained were three small tacks driven in with a hammer at the three points specified. These three locking devices serve the further purpose of preventing the slightest displacement of the castings on the abutment teeth in taking the impression and bite registration.

To elucidate, let us compare the stability that would be gained if one, two, four or more points were used instead of three. An abutment would pivot around a single pin retention or groove. A line joining two grooves on an abutment would serve as an axis of rotation.

Stabilization is first effected by a minimum of three points, as in the case of a common three-legged stool. Then too, the surface on which a three-legged stool

rests does not necessarily have to be smooth as is the case of a four-legged one. Thus, complete retention of abutments is attained by virtue of design, and with only reasonable demands on workmanship.

If four points are used in the preparation, parallelism is made more difficult, and too high a premium is placed on precise workmanship. It is very likely that only three points are ever useful. The others are redundant.

A. POSTERIOR ABUTMENTS

1. *Inlays.*—Indications: The following combination of conditions should exist before inlays are used as bridge abutments: 1. The teeth should be absolutely rigid in their sockets. 2. The teeth should be free from deep undermining decay.

Fig. 1.—Inlay preparations for upper first bicuspid and upper first molar. The basic form is tripodal.

3. The occlusion should be favorable; i.e., the teeth not unduly tilted, nor musculature excessively powerful. 4. Edentulous spaces of not more than one tooth should be bridged. 5. The teeth should be clinically hard; i.e., should offer considerable resistance when burs and stones are used.

Rationale of choice: When the foregoing requirements are met, inlay abutments are very successful. They offer ample strength to meet contingencies. Inlays are more easily prepared and developed than the other abutments because their placement is a more routine procedure.

Preparation: The teeth are prepared along the lines of Black's preparations, having parallel walls and beveled cavosurface angles with good retention in the fossa opposite the proximal surface utilized. (Figs. 1-2.)

For example, if we wish to make a mesioclusal inlay in a lower molar, the mesial surface should be sliced to where it is parallel with the distal surface of the anterior abutment tooth. It is much better to have these surfaces tapered a little gingivoclusally than to have any undercut whatsoever.

After preparation of the mesial step, two pin retentions are made in the point angles, one at the gingivobucco-axial angle, the other at the gingivolinguo-axial angle. These pin retentions are made with a No. 700 tapered-fissure bur, not more than 0.5 mm. deep.

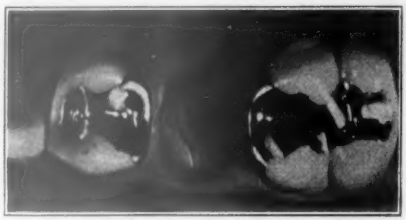

Fig. 2.—Inlays in position.

The occlusal step is seated in dentin, being perfectly flat, rather wide and not too deep. It is carried well into the distal fossa where a 0.5 mm. increase in the depth of the cavity is made. This gives the basic tripodal balance. I have found it practically impossible to obtain the resultant stability in any other manner.

2. *Three-Quarter Crowns.*—Indications: The indications for three-quarter crowns are: 1. One span bridges where inlays are contraindicated. 2. Two span bridges where full crowns are contraindicated, the buccal surfaces being left uncovered for esthetic reasons.

Rationale of choice: Three-quarter

crowns, when used on weakened teeth, tie the cusps together and offer considerable support. In mouths susceptible to decay, the covered surfaces are obviously immunized, yet an uncovered esthetic surface remains. Three-quarter crowns are very retentive.

Preparation: All posterior teeth are prepared in a slightly different manner, depending on the tooth, its anatomic form and its position in the arch. All preparations are shoulderless, but have definite finishing lines. The distobuccal margins are extended progressively more in a buccal direction, from the first bicuspid back to the third molar region.

Gingival margins never extend under the gum tissue, unless decay necessitates their extension that far. The reason for this is two-fold. First, if the margins are on the enamel of the exposed surfaces of the teeth, we can see our failures and overcome them before the teeth are lost. Secondly, irritation of the gum tissue is avoided. Regardless of how well an abutment that extends below the gum margin fits, there will always be some irritation.

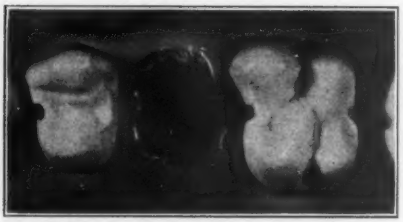

Fig. 3.—Three-quarter crown preparations on upper first bicuspid and upper first molar; tripodal form as developed in each. A very shallow groove is made on the distal side of the prepared area of the molar to facilitate refinement and adaptation of the wax pattern only. The mesiobuccal cusp remains intact and gives the desired esthetic effect.

a. Upper first and second bicuspids. The axial surfaces are paralleled and carried well into the gingival third. The margin of the distobuccal angle is brought well through to the buccal surface. The mesiobuccal margin is brought just through the contact point, as the solder joint is going to be on the distal surface. This will prevent a needless display of gold on the mesiobuccal surface. (Fig. 3.)

The occlusal surface is a reduced reproduction of the anatomic form instead of a perfectly flat surface. To avoid a fragile buccal wall, the occlusal finishing line is made V-shaped and ends midway between the buccal cusp and the occlusal sulcus.

Two grooves are placed on the distal surface and one groove is placed on the mesial. The mesial groove is placed as far buccally as possible to permit a sliced lap beyond for seal. The distal grooves

Fig. 4.—Three-quarter crowns in position.

are placed at the bucco-axial and linguo-axial line angles. (Figs. 3-4.)

b. Upper first and second molars. These teeth are so prepared that the mesial, lingual, distal and distobuccal cusps and occlusal surfaces are covered. Strictly speaking, they are seven-eighths crowns. One groove is placed on the mesial surface, one in the lingual groove and one in the buccal groove.

c. Lower first and second bicuspids. The procedure is the same as for upper bicuspids, except that the third post is usually placed at the apex of the Y fossa, which is away from the nerve.

d. Lower first and second molars (in immune mouths). The mesial, lingual, buccal and occlusal surfaces back to the distoclusal marginal ridge are covered.

Three parallel grooves complete the preparation, one on the mesial surface, one in the lingual groove and one in the buccal groove.

3. *Full Crowns.*—Indications: The indications for full crowns are: 1. All bridges carrying more than two teeth. 2. All posterior teeth in highly susceptible mouths where esthetics is not a factor, regardless of the span.

Rationale of choice: Full crowns are the least destructive abutments on unmarred teeth, and the strongest and most retentive. They tie weakened and broken down teeth together. In highly susceptible mouths, all coronal surfaces are protected from the ravages of decay.

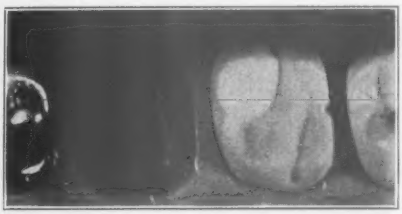

Fig. 5.—Full crown preparation on upper second molar. The tripodal formation of grooves is in evidence; also the slight fourth groove or shallow "convenience" groove. As stated before, the "convenience" groove offers no retentive feature whatsoever, but facilitates wax adaptation.

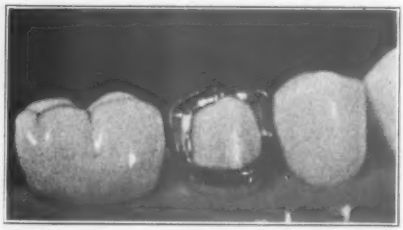

Fig. 6.—Modification II of full crown preparations. A porcelain inlay is used to avoid a display of gold on the buccal surface.

Preparation: In full crown preparations, the procedure is similar to that for posterior three-quarter crowns and the grooves are the same. The occlusal surface is again reduced anatomically as to cusps and fissures. The margins are again laid above the gum tissue when possible. (Fig. 5.)

Modification 1 (to avoid a display of gold on the occlusal and buccal surfaces of lower bicuspids): A diatoric bicuspid tooth is ground and employed in conjunction with a full crown preparation. A shoulder may or may not be used.

Fig. 7.—Porcelain facing in position.

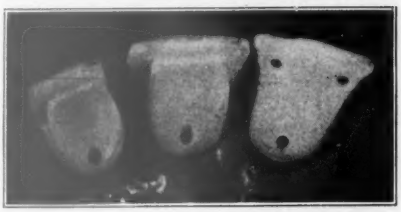

Fig. 8.—Upper right central incisor showing typical anterior three-quarter crown preparation; upper right lateral incisor, modification I, to avoid display of gold at mesio-incisal angle; upper left central incisor, special three-quarter crown or Alexander attachment. The basic tripodal form is developed in all anterior attachments as well as posterior.

Precision attachments may be used by modifying slightly.

Modification 2 (to avoid a display of gold on the buccal surfaces only): Porcelain inlays, baked porcelain facings or ground stock diatoric teeth are used on

the buccal surfaces. The gingival portion of the gold on the buccal aspect is not destroyed unless this is necessary to prevent a break in the seal. (Figs. 6-7.)

Preparation of the boxes for porcelain will be described in the discussion of anterior abutments.

B. ANTERIOR ABUTMENTS

1. *Three-Quarter Crowns.*—Indications: Three-quarter crowns are indicated on all noncarious teeth:

Preparations: A tapered fissure bur No. 700 is used in an incisogingival direction on the mesial and distal surfaces to form two parallel grooves. These initial cuts go straight through just lingually to the labial embrasure and extend through the contact points. The labial walls of the grooves are smoothed and paralleled with chisels to create the effect of a Steele facing. Clearance is established lingually from them at the gingival border.

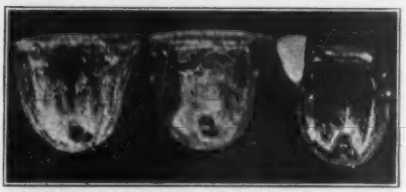

Fig. 9.—Gold castings. The porcelain inlay is shown with the lateral abutment.

Fig. 10.—Labial view of attachments in position. There is no visible display of gold.

Next, clearance is made on the lingual surface for sufficient thickness of gold, and a slight amount of enamel is removed on the lingual surface at the incisal edge. A slight shoulder is made just lingually to the incisal edge. This shallow shoulder joins with the mesial and distal grooves, and is used as a stop for the three-quarter crown at the incisal edge. Dentin is always left between the enamel and the shoulder. (Figs. 8-9.)

The gingival margins are finished in the enamel if possible. Lastly, a pin retention is made at the cingulum parallel to the axial grooves. (Fig. 8.)

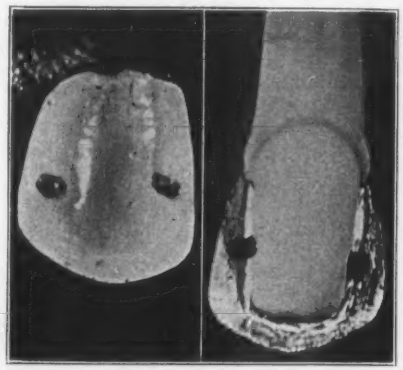

Fig. 11.—Three-quarter crown preparation on upper cuspid. The casting is in position and the two pin retentions made to receive a porcelain facing are shown. (Preparation suggested by R. Z. McClung, Birmingham, Ala.)

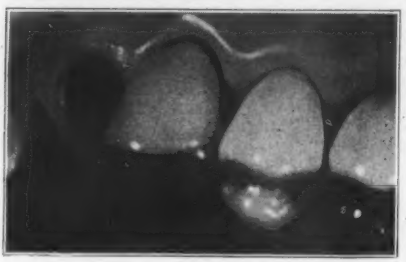

Fig. 12.—Porcelain facing of preparation shown in Figure 11, in position.

This preparation, when carefully executed on an abutment tooth that has not been marred from decay, produces a finished abutment without the slightest amount of gold showing. Equally im-

portant is the prevention of a cement line or discoloration at the incisal third of the prepared area. We have been using this preparation for years, and it has proved satisfactory from esthetic and retentive standpoints. (Fig. 10.)

Modification 1 (indicated on broken-down teeth involving one angle, to avoid a display of gold): A typical preparation is made to include this angle and its parallelism with the other surfaces. After the preparation has been finished, and the wax pattern has been adapted on the tooth, that portion of wax which will show gold in the finished crown is carved out, and a slight box is made for the reception of a porcelain inlay. The pattern is cast, placed back on the tooth and finished for fit and contour of gold. The box to receive the porcelain is now completed by making a pinhole in the center of the box slightly gingivally of the contact point and as deep as the thickness of gold will allow. This hole, of course, will receive a platinum pin. An impression is now taken and a porcelain inlay with a platinum pin is made. The platinum pin must be placed deep enough in the porcelain to prevent its showing through and discoloring the finished inlay. The inlay is cemented after the bridge has been set. (Figs. 11-12.)

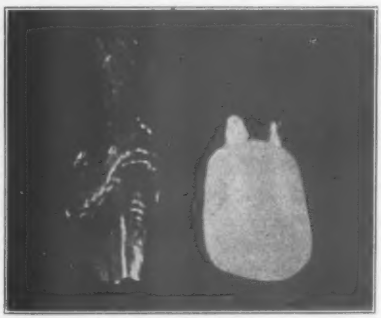

Fig. 13.—Full crown preparation on lower left cuspid. A diatoric tooth was used on the labial aspect to avoid a display of gold. The labial shoulder of gold in this case was not disturbed.

Modification 2 (indicated on teeth where there is destruction of both angles, and labial decay, and, in spite of this destruction, a cast gold three-quarter crown is still desired): The procedure is the same as in modification 1, in that the wax is brought through to form at both angles. After the wax has been adapted and fitted, it is cut back to where it will not show after the porcelain inlay is made.

The pattern is cast and carried back to the mouth, and the entire labial surface is prepared for the reception of the porcelain inlay (or porcelain facing). The preparation is made with a shoulder at the gingival border, and pinholes on the mesial and distal surfaces in the gold. Sufficient thickness is cut away from the tooth on the labial surface to allow the porcelain to extend from the gingival to the incisal edge, thus blocking out all signs of gold from the labial surface and proximal embrasures. This preparation is completed by making the two pinholes (labiolingually), one on the mesial aspect and one on the distal aspect, just inside the contact points. These two pinholes are made to receive platinum pins. Thus, the completed facing resembles a commercial long-pin facing.

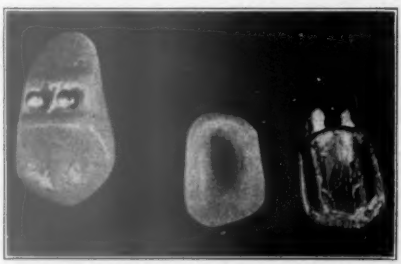

Fig. 14.—Diatoric tooth selected and ground to position and form. The receptacle in the gold casting for the facing is to be noted. (Attachment suggested by W. F. Andes, Miami, Fla.)

After the bridge has been cemented in position, this facing is set and acts as a lock for the abutment piece, thereby enhancing the strength of the bridge.

2. Special Three-Quarter Crowns.—Indications: The special three-quarter crown is indicated on a tooth presenting very pronounced mesiolingual and distolingual lobes and practically no cingulum. This gives the tooth a cupped out lingual surface, thick on the mesial and distal aspect and very thin in the center.

Rationale of choice: In preparing this type of tooth with the ordinary three-quarter crown, one of three things is likely to result. First, too much tooth structure will be involved. Secondly, a display of gold must be made. Lastly, there will be very little or no retention and perhaps actual interference with the removal of the impression owing to this depression in the central portion.

These disadvantages have been overcome by the use of the so-called Alexander attachment. (Fig. 8.)

Preparation: The mesial and distal surfaces are finished with slight bevels just labially of the contact points. The lingual surface is reduced to allow for a sufficient thickness of gold. In completing the preparation, three pinholes about the size of or slightly larger than a No. 700 tapered fissure bur are made at a 30-degree angle from the long axis of the tooth. One pinhole is placed on the mesiolingual aspect at about the beginning of the incisal third. The second pinhole is made at the distolingual aspect at about the beginning of the incisal third. The third pinhole is made at the gingival aspect slightly above the finishing margin.

It goes without saying that the abutment preparation for the other end of the bridge must be of the same type and have its grooves parallel to the grooves of the first abutment.

3. Full Crowns.—Indications: The use of full crowns is suggested on teeth where there is involvement of both angles and considerable labial and lingual destruction. (Figs. 13-14.)

Preparation: These full cast crowns are always used in conjunction with baked porcelain facings or ground porcelain veneers from stock teeth. The teeth are prepared as for jacket crowns with the exception that the lingual shoulder may or may not be used. A baked porcelain facing is made as described above.

If a diatoric tooth is used, one is selected of proper shade and size and ground to the labial shoulder at the gingival border. It is then ground and waxed for form, alinement and occlusion.

In the case of an unusually low lipline, it may not be necessary to abut the porcelain veneer labial shoulder at the gingival border. In such a case, the gold seal is not broken at the gingival border.

CONCLUSION

These abutments serve well for a flexible standardization. With slight modifications, they will meet every reasonable individualistic demand for attachments on vital anterior and posterior teeth.

Mechanically, they seem to possess the necessary and minimum conditions for retention and prevention. However, abutment design offers an infinity of possibilities.

Medical Arts Building.

PSYCHOLOGY AS APPLIED TO THE DENTIST AND HIS PATIENTS

By Robert K. Brown, D.D.S., M.S., F.A.C.D., Ann Arbor, Mich.

A speaker should have a central theme around which to build his discourse. My theme is psychology, the study of mind and behavior. If this definition needs elaborating, we may say that psychology deals with the prediction, cause and control of human behavior; for the human body responds in characteristic ways to forces acting upon it and these responses depend on the condition of this machine, the human body, at the moment, its past experiences, the chemical changes going on in the machine at a particular time and the immediate elements that go to make the situation that calls forth the response.

The trained psychologist, as a result, must know the native habits and instincts that man possesses, the laws of habit formation and modification that result in the development of more complex forms of behavior from the native or instinctive types and the varieties of stimuli that affect the sense organs of man and the relative effectiveness of each.

This seems a dry and very theoretical series of statements, but, in applying these principles in the practice of our profession, it will appear that we are only using common sense, which, basically, is really psychology. Every dentist, since he deals intimately with his fellow men, would be amply repaid if he made the study of applied psychology one of his hobbies. An hour or two a week reading recognized books on this subject would enable him to deal far more successfully with his fellow members of society than most of his colleagues are doing. The ability to influence people is not an endowed characteristic, but must be acquired, and the acquisition is easier for some than for others. It is unfortunate that most of us feel that we know a great deal about ourselves and our relations to society, for most of what we think that we know on these subjects is wrong.

The dentist, in applying psychologic principles, desires:

1. To understand his own personality; that is, the sum total of the effect that he has on other people.

2. To understand the personalities of others and know how to influence, guide and direct them in their attitudes of conduct as they are related to his professional contacts.

3. To make others like him and understand him, so that he can accomplish professionally what he desires, to render ideal health service.

In educating his patient as to what dentistry has to offer, the dentist is successful if he has a pleasing personality; for he is a salesman of health, and the success of his presentation is in proportion to the impression which he personally makes on the patient. The proper psychologic procedure is, first, to measure or evaluate our own personality. Any college graduate has intelligence enough to pursue any profession, but he may

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have every mental and technical qualification necessary and yet be a dismal failure. In fact, dependable surveys have shown that 85 per cent of a professional man's success depends on certain qualities that make up his personality, and 15 per cent on technical skill and knowledge.

But how can we study our own personality? George W. Crane, of Northwestern University, has given us a scientific method for rating ourselves. He suggests that we use:

1. An aptitude test. This can be self-administered and is in the form of some standardized intelligence test such as the Army alpha test.

2. An achievement test. This measures our ability along certain lines, much as our school examinations did. The Moss social intelligence test is a good example, for it measures both aptitude and achievement.

3. A vocational interest test. This shows our interest in our profession. The Strong vocational analysis test is a good example.

These three tests are subjective in type; that is, they are self-administered, taken by the subject himself and graded by him if he so desires. Two other tests complete the list. They are objective, the result of the observation of others in regard to certain behavior of the subject.

4. Physical tests made by a physician to be certain that the human machine is in good working order and suffering no handicaps. Many of us neglect to have a thorough physical examination every year or two. How can we perform efficiently when we are not in good health?

5. Social attitude tests. These may be either subjective or objective in type, the latter being preferred.

(a) The subjective type (self-administered) is exemplified by the Bernreuter personality inventory or the Louis K. Thurstone social attitude test. These tests may be purchased by any one and are accompanied by directions for administering them, with scoring methods and tables for comparison as to how one ranks with others. At the conclusion of this paper, information is given as to where these various tests may be purchased.

(b) The objective type. This is illustrated by the use of various forms of rating scales, the graphic type being the most satisfactory at present. This method of procedure, which is very useful for the dentist, is as follows: Printed forms listing a series of traits, such as honesty, personal appearance, efficiency and emotional balance, are sent to patients asking them to rate the dentist in each of these qualities. Five degrees of possession of each of these qualities are listed, each patient or rater marking the particular degree of this trait that he thinks the dentist possesses, and explaining after each marking just why he has graded him as he has.

These forms are standardized, but there are several difficulties. The patient must have at least average intelligence in order to be a capable judge or rater. A third party must send the scales to the patients and have them returned to him after they are rated. The patient will be more cold-blooded in filling in the scale if it is not to be returned to the dentist. Scales should be filled in or rated by approximately twenty patients. From the information received from these scales, a master scale is evolved, which will give a good cross-section of the personality of the dentist as it has appeared to others. Obviously, if the dentist selects twenty of his best patients, the result will be too satisfactory; but if he selects five of his best, five of the average type, five of those with whom he has had difficulty and, most important of all, five who have left his practice, his eyes may be opened to the reasons why he does not have an integrated personality.

It is only human that the man who is being rated will blame the disinter-

ested third party for any adverse criticism; but he must forget this phase of the study, for the third party does not enter into the scheme of things except as a reporter. When the result of this study is made, and the findings of the other tests are assembled, one has a definite foundation on which to start modifying his personality. If he has the real desire to do this, and the will power to carry it through, no difference what his age may be, he can accomplish a great deal.

The greatest handicap that any one faces is the so-called inferiority complex, and every one possesses it in varying degrees. There are two basic causes for this: The first is personal. It may be of a physical nature, from lack of height, obesity or various other physical handicaps. It may result from mental inferiority, a feeling that one is not on the same intellectual plane as many of one's associates. It may be of a moral or social type. The second cause is based on a vivid past experience, perhaps ridicule from parents or classmates over some escapade or on an occasion when singing, reciting or some athletic pursuit was indulged in. Perhaps parents or friends in recounting vivid past experiences, such as accidents during travel and a fatal illness, engendered fear in the subconscious mind.

The person who suffers markedly from an inferiority complex is prone to boast and to shirk any task that he fears, and he will try to rationalize his present position by using reasons for not attempting these tasks. Try to get some one to speak whose past experiences along this line have been disastrous: He can give very convincing reasons why he cannot attempt to grant your request. It is necessary for one to overcome this complex and he must analyze himself and get at the cause or causes, always bearing in mind that a feeling of inferiority is a sign of more than average intelligence.

The feeling of inferiority must be removed by using a compensating procedure of conduct that will afford a feeling of superiority. Many rely on religion or on getting more and more knowledge along a certain line of thought so that they really become specialized. Mastery of some form of athletics will do a great deal, for if one feels that his ability is specialized and is gaining some recognition, a feeling of superiority develops. If an inferiority complex is overcome, further improvement of one's personality becomes possible: we will be able to get along with others better, for we will like them and they, in turn, like us. We have lost our feeling of embarrassment and are developing self-confidence.

The pleasing personality that can represent us is our first step to success, and we can secure it if we so desire. For the present, let us assume that we have it. Our next point of attack is getting along with others. Many of us are too timid or too indolent to attempt this. We must find out what people are like; why they do as they do; why they like or dislike certain persons or things, and why they do certain things and avoid doing others; in other words, how we can acquire an understanding of human nature. Donald A. Laird says that people will dislike us:

1. If we make them fear us. We may gossip, be sarcastic or do other things that engender fear on their part.

2. If we deflate their ego; i.e., make them feel inferior to us as well as to others.

3. If we do petty things that irritate or annoy them. It may be biting finger nails, coughing continually, blowing the nose, running the fingers through the hair, etc.; but it often creates a feeling of antagonism or dislike on their part.

Conversely, they will like us if we:

1. Like them and show it. Make them feel important. Pay them direct compliments tactfully.

2. Buoy up their self-esteem and inflate their ego. We can do this by asking questions or seeking advice; allowing

them to talk and express themselves or praise wife, children or worldly possessions.

3. Do not try to reform them.

4. Avoid gossip and controversial issues such as politics and religion.

5. Act cheerful, sympathetic and tactful. Many dentists are lacking in these traits, which are easy to acquire and develop.

6. Establish correct relations through common or specific interests, but do not be egotistical yourself in doing so.

In other words, if we leave a person with a feeling of satisfaction with himself as a result of his contact with us, he cannot help but like us. Try the following procedure just once, using a smile. At a propitious moment when a patient is seated in the chair, say, "That is a very pretty dress you are wearing, Mrs. Jones," or "That is a fine looking suit you have on today, Mr. Jones." If the patient is fat and 40, or 60, or even 15, observe that smile of contentment and happiness. Try it; it pays.

Science always classifies its findings, and it is worth while to attempt some classification of our fellowmen. Physiognomy and phrenology attempted to do this, with far-reaching results that were often ridiculous and have been proved to be scientifically unsound. They are about as trustworthy as an astrologic horoscope, but perhaps we, like many others, may believe in one. Today, we recognize individual differences and the fact that even the individual himself differs every hour and every day. However, we can recognize these main types:

1. The introvert type, the shut-in soul who lives in his own world. He is the thinker, the student, the research worker who likes to work and be alone. A classic example was President Wilson.

2. The extrovert type, the hail fellow well met, the optimist, the Babbitt type, typified by Theodore Roosevelt and, to a large extent, by Franklin D. Roosevelt. These types are the extreme ranges.

3. The great mass of humanity falls in the middle-ground known as the ambivert type, which possesses, in varying degrees, the qualities of both the extravert and the introvert type. This is the preferred classification, of course, but the extremes interest us, for here our knowledge of handling people must come to the front in order to direct their conduct.

The dentist should know to what classification he belongs and should recognize his weakness or strength, so that he can modify and reserve his tendencies, to be better able to mingle with his fellowmen. The old temperament classification had some merit, but it was too difficult to follow, for it had many overlappings and the types were not distinct.

Mental classification of our patients is almost instantaneous, but we must remember that often first impressions are erroneous. The successful physician must understand his patient and is constantly "sizing him up." He is treating mental ills as well as those of physical origin. We must be just as thorough; for we also have both types of diseases to combat and we must develop our powers of observation as much as possible.

When we have classified the patient, we must determine what our approach to him is to be so he will like us as well as have confidence in us as professional men. We must master tact and finesse, for through these agencies we attain, maintain and retain popularity. Dr. Crane again gives us some worthwhile suggestions as to how to become popular.

1. Show your merits without deflating the other person. People like to number among their friends and professional men those who are important. You should:

(a) Watch your physical condition, control excess weight and keep your human machine highly efficient.

(b) Be very careful of your personal appearance; be clean, neat and orderly. This does not need elaboration; just look the part of a professional man and do not let yourself be known as "just a dentist."

(c) Study your assets and accomplishments and build on them tactfully; in other words, brag a little. This does not mean to tear down others to elevate yourself.

(d) Extrovert yourself as an individual, and, in doing so, you will aid in maintaining your poise, will power, dignity and self-confidence. It would be well for all of us to extrovert ourselves at least to this extent:

Go to some church or aid in some phase of church work at least once a week. Boy scout work comes under this heading.

Belong to a luncheon group, club or lodge, or some similar organization and attend a meeting each week.

Indulge in some social activity each week such as a concert, the theater, movies, golf and bridge.

2. Leave a person feeling more satisfied with himself as a result of his contact with you and he will like you. Do not neglect to pay tactful compliments phrased and timed correctly.

(a) Make the other person feel important by asking advice, or for information or directions.

(b) Give him credit for knowledge and experience even though he may not possess it.

(c) Give him credit for having attraction and charm.

(d) Compliment him on his possessions: his home, car, children, pets and various other things he values. Again let me repeat, use tact and courtesy.

Let us study the emotional actions of people as we contact them, watching their posture, changes of facial expression, the tone of their voice, hand movements, eye reactions and movements of the throat. These are barometers that register the present mental and physical state of every individual. We wish them to register pleasant emotions, not those of fear or dread. This is an axiom to remember. Eighty per cent of our patients leave us for certain psychologic reasons; i.e., because of dandruff, halitosis or body odors; a weak personality; dingy and ill-kept offices, etc., and seldom because our service and workmanship are not up to standard. If we have pleasing personalities and can manage ourselves and have the ability to get along successfully with others, we will enjoy an enviable professional life.

There are only two ways that we can influence people: by our actions and by our speech; but the influence of our actions can be greatly increased or diminished by our speech. There are inborn urges that move all men—the instincts—and these control to a large extent their actions, aims and ambitions. The two basic or natural instincts are self-preservation, the first law of Nature, and love in its broad sense. We may appeal to either or both of these basic instincts through the emotions, which have developed from these basic instincts as life has progressed. The professional man is interested in those emotions which have developed from the desire for self-preservation, and, to a lesser degree, those of parental love, the protection of one's family. The emotions of most interest to us are pride, fear, protection, comfort and convenience, and these include health, appearance, attractiveness and cleanliness. People trade their money in return for service or merchandise only when they are motivated through the emotions. Let us keep our minds on the other man and what he wants.

The first step in influencing and directing the conduct of others is to attract and secure their attention. There are only five channels leading to attention. They are the five senses: sight, smell, sound, taste and touch. As attention to one thing can be held for four seconds, some new stimulus must operate on one or more of these senses every four seconds. We might knock a man down and secure attention, but we want a favorable type, given to us voluntarily.

The intensity and concentration of the stimulus causes one to pay the closest attention. A red electric sign attracts our attention, but if it flickers on and off, we pay more attention. If it is in motion, as a chair rocking, or if colored sunbursts occur in the sign, our attention is

attracted a great deal more. Our patient must be in the right condition to receive the stimulus, of course. We must remember that actual pictures or word pictures are poor substitutes for reality. A real object should be used to secure attention whenever possible and the use of models in our work, or concrete objects such as x-rays, is of paramount importance.

We should appeal to as many senses as possible at once, and, in doing this, in a health presentation for example, our offices should be free from interruptions. The surroundings should be restful, with the dentist at ease and undisturbed. Telephone bells should be muted, there should be gongs on entrance doorways rather than buzzers, etc., and the assistant should be quiet and efficient, taking the burden of all details from the dentist. The dentist must not engage in random conversation with his patient after the first few preliminary remarks: he must be in control of the situation.

We must find the dominant reason why the patient has called on us, adapt our temperament to that of the patient and our presentation along the lines he has first suggested, directing it later into the channels we wish to follow. If a patient is nervous or fatigued, it is often wiser to do some preliminary work and overcome this state and make a future appointment when we can go into detail as to the services we wish to render. We must not be too hasty at the start: it often pays to get the patient *en rapport* in order to render the best service to him. We should demonstrate how important his case is to us, and that it will require time for study.

When we have secured his attention, we make our appeal through the instincts. We have aroused pleasant feelings and laid the groundwork for our appeal, which is mainly to self-preservation, the greatest "drive" influencing a human being. Through our appeal to this instinct or urge, we arouse a desire on the part of the patient to do what we would like to have him do. In other words, we are influencing and directing his behavior.

Desire falls into three classes:

1. The condition of one's being (safety, health, comfort, pleasure).
2. Objects (clothes, money, jewels, cars, etc.).
3. Qualities of objects (desirability, beauty, etc.).

We appeal to the condition of one's being on the basis of health, beauty and comfort. Desire always finds its center in self and its comfort, aggrandizement, prestige, safety, efficiency, etc., all qualities that are a part of self-preservation. If the desire is engendered, but its accomplishment demands effort, we encounter our first stumbling block. If the effort to secure the desired thing is to be of a pleasant type, well and good. In our work, unfortunately, the effort the patient has to go through is not pleasant and this makes our tasks much more difficult.

When we have the proper instinct properly active, we should strive to attain a pleasurable feeling or desire for the type of thing that we present to the patient, and then present the specific, concrete things that we wish him to accept. However, this interest is merely a probationary period and does not mean acceptance of our proposition. We must put all our influence into this stage of our presentation so that it will attach itself to those already in the patient's mind, whether they are in his active consciousness or in his dormant past experiences.

In our efforts at influencing a person, there is a powerful ally at our command, the power of suggestion. Have you ever tried this on a patient? After a new patient has been given a prophylactic treatment and a digital oral examination, casually remark "You see my x-ray machine over there, do you not?" Note the wording of the question. This gives us a

lead to discuss what the x-rays mean to us and to the patients in our practice, but not as it might be applied to this particular patient: that comes later. Soon we can present specimen x-ray films to the patient, explain them and thus create an opportunity to produce various models, etc., for his consideration.

We have secured attention through uggestion; engendered pleasant feelings; appealed to that great drive, or instinct, self-preservation, and aroused a desire to improve the condition of one's being. Suggestion is merely a skilful manipulation of attention, but too many dentists feel that it does not pay to "waste" all this time. They are prone to fill the big, aching void in one tooth and forget their duty as health servants, to suggest just what the entire mouth should have to be placed in an ideal condition from the viewpoint of health and efficiency. I believe that the cornerstone of a successful dental practice is the x-ray machine. Indeed, we all know this to be true.

It is not amiss to state here that after we have made our presentation and outlined our contemplated methods of procedure, we should dwell on the rewards that the patient will receive if he follows our advice. If the rewards will overcome or outweigh the unpleasantness that the patient must experience to consummate our plan, our case is won. We must not arouse the emotion of fear, or of anger. Dentists play on fear too much. We must rather attack through the field of quiet, pleasurable emotions, using suggestion to direct attention or interest. People think best in the absence of strong emotions such as fear, hatred and anger. If we find that our presentation lags or is at a virtual deadlock, we then resort to action, pick up a model, look at the sterilizer or walk to another place in the room; for action tends to break this deadlock and direct attention into another channel. New mental associations are set up and it is possible to resume the subject from a different angle, getting a fresh start. Merely asking our patient a question somewhat off the general trend of our discussion will accomplish it. This, "the shift of attention" theory of the psychologist, is used by all successful public speakers and salesmen.

However, we must always have confidence or belief in ourselves. The opposite of this is fear or embarrassment, which is a phase of inferiority. We are supreme when talking to our patient. We know far more than he does about our field, so why be afraid? And we should always remember this: The fundamental characteristic of a really great man who has a pleasing and forceful personality is his deep and sincere interest in the welfare of others; and these others recognize his greatness through appeals to their "self," which is always the center of interest to any one.

This presentation may sound like a course in salesmanship. It is. We are health servants; we have available ways and means that will lengthen the life span, and make one comfortable, attractive and efficient. Our public is not aware of this, for we cannot advertise our ability and accomplishments. Each dentist must be the salesman of our profession and do his part in educating the people. This calls for salesmanship. The time is past for the old type of professional atmosphere, which was often made up of ignorance covered by pomposity, hiding under a crop of whiskers, a frock coat and gold-headed cane. We must keep abreast of the times. Salesmanship requires intelligence. It is not an endowed accomplishment: it is an acquired one, and it requires hard work.

Certain details of practice that may seem important to many dentists have not been discussed: how to combat low fees and competition, how to get patients into the office, etc. These problems are highly individual, but if the principles outlined in this paper are followed and

mastered, these problems will rapidly diminish.

If our patients like us and have confidence in us, and if we tell the story of dentistry to them as it applies to their particular case, in a way that creates a desire on their part to attain it, and if we have pictured the reward so emphatically that it will overcome the unpleasant feelings that have begun to germinate when they think of what they will have to go through, we have practically convinced them and closed our presentation. We must not forget to outline our procedures in reaching the end result so they will appear rather easy in comparison to the patient's past experiences with dental work, telling them of the comfort that procain and other anesthetics will afford, and explaining the advantages of using sharp newburs and true running abrasive stones, with tepid water to lessen frictional heat. We should tell them that they may have to come to us only one or two hours a week, so their nervous systems and their pocketbooks will not be subjected to too great a strain, and presto! before they know it, their mouths will be in the best possible condition, probably for the first time in their lives.

However, we shall have to combat certain forms of sales resistance in many cases. People feel that they cannot afford good dental service. Here, self-preservation enters into the picture as a basic argument. They are afraid that the expenditure may annoy husband or wife, as the case may be. They have had similar work done that was not satisfactory. They can get the work done cheaper elsewhere. This again calls for the use of models and careful descriptions of what constitutes good dental work, using the statement frequently that "the recollection of quality remains long after the price is forgotten." They are told of individual cases in our practice that have given satisfaction for years, with little effort or expenditure to the patient in the way of upkeep or discomfort.

They would rather buy a fur coat or radio, take a trip or make some other form of expenditure that gives them a temporary pleasure or satisfaction. They may dislike our personality or our high pressure salesmanship. This is under our control. This is the point at which we must use reason to reinforce the desire we have created on their part, but we must use it carefully when the patient is vacillating or when the price seems too high or competition is great. If the patient prides himself on being logical and not swayed by his emotions, let us compliment him on this fact and use reason.

If the patient is interested in what we say as it applies to him, and if what we have presented is a new idea and important to his well being, his desire is aroused and it requires little reason to accomplish the result we desire. What is reason? Merely showing the patient, through the use of x-ray films, pictures and models, what he needs for a complete mouth restoration, using, as well, brief logical explanations in language that he can understand. We cite from noted authorities the importance of dental health to his physical well-being, his health preservation and then illustrate our point with practical cases in our practice. He may know of some of these patients and what it has meant to them, and, by analogy, he may reason that he needs the same type of service.

Again, we must remember that individuals differ and our presentation must differ, on the basis of our estimation of the person to whom we are talking. The same procedure will not work with the child as with the adult. The debutante and the practical business man require different handling. Our technic differs with young, middle-aged and elderly people, with those in health and with those who are ill. We must differentiate between individuals, and this is the fundamental and most important step in being able to control, direct and influence

others. It is acquired, but involves study, time and effort.

If we wish to serve our clientele, we must be able to say "convincing words." A large merchandising house summarizes salesmanship for its employes in a way that is brief but pointed. Dwight Everett Watkins gives it in his book "The Convincing Word."

Therefore, if you wish to say the "Convincing Word" in salesmanship: Show respect for your customer.

Do this by knowing his habits, hobbies, the things he has done in the past, the things he owns, his knowledge, his opinions, the people he admires, his wants and his needs.

Speak the language of the patient and learn to think as he thinks.

Encourage him to talk about his own affairs.

Make him feel he is important to you.

Ask his advice about something.

Find out what he wishes and never over sell him.

Compliment him.

Be pleasant and never lose your temper.

Master the art and science of salesmanship.

Do things not required of you, throw a little extra into the bargain.

Study books on your business and your job.

Consider your appearance, look to your figure, your clothes, the colors you wear.

Be careful of your speech.

Learn to think straight.

Cultivate your memory. (The sweetest music in the world to a person is his own name.)

Make yourself interesting by widening your own experiences and interests.

Don't worry about your inferiority complex: simply remove it.

Don't bluster.

Don't be nasty, but moderate, kind and approachable.

This is a summary, but it admits of endless elaboration. Let us study it and use it as a guide. If we follow it, we will be repaid, for in so doing we will be able to:

1. Manage ourselves.
2. Get along with others.

In conclusion, let us quote two very old sayings: "To thine own self be true and it must follow, as the night the day, thou canst not then be false to any man." And the guiding rule of our profession, "Do unto others as you would have them do unto you."

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Army Alpha Test, Forms 6, 7, 8, or 9. C. H. Stoelting Co., 424 N. Homan Avenue, Chicago, Ill.

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ANESTHESIA AS AN ETIOLOGIC FACTOR IN OSTEOMYELITIS OF THE JAWS

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ONE of the sequelae most feared by surgeons in bone injury or surgery is the ever-present possibility of infectious osteomyelitis. The maxillae and the mandible seem to manifest a greater resistance to this dreaded disease than other bones of the body. Baranoff[1] states that osteomyelitis of the various bones, according to Leibold,[2] occurs in the following order of frequency: femur, tibia, humerus, radius, ulna, vertebrae, os calcis and mandible. Trendell, as quoted by Wilensky,[3] found twenty-eight cases of osteomyelitis of the jaws among 1,279 cases of osteomyelitis of all bones. Among 262 cases of osteomyelitis reported by Pyrah and Pain,[4] there is one case of osteomyelitis of the mandible. In Platt's[5] series of forty-one cases of osteomyelitis, another single case is listed.

The foregoing references show the incidence of osteomyelitis to be greater in the mandible than in the maxillae and to be more often unilateral than bilateral. It more frequently follows single than multiple extractions. Some cases follow injuries to the jaw bones from gunshot wounds, fractures and similar injuries and certain chemical poisonings. The latter form, however, is rare and is usually localized, chronic and less severe than the infectious type.

This immunity of the jaws as compared with other bones of the body to osteomyelitis may have several factors; the first being physiologic and the others being due to improved methods in oral diagnosis, surgery and extraction of teeth and the more discriminating selection of anesthetic agents. It is of added interest, therefore, to note the statement of Harold Round[6] that from his investigation of the subject of osteomyelitis in the jaws observed at Queen's Hospital, Birmingham, England (where, incidentally, nitrous oxide-oxygen is the anesthetic of choice in all dental operations), infection from injection anesthesia may have been the causative factor in a majority of cases.

He bases his opinion on many outpatients that received local anesthesia for extraction by dentists not associated with the hospital.

In England, this may be accounted for by the advent of panel dentistry and the dole, for many patients treated by dentists cannot be given the refinements of hospital and office practice prevailing in more favored communities. Some of these cases may have had their inception in exodontic procedures without anesthesia. This presents an interesting perspective for comparison with similar cases of osteomyelitis of the jaws occurring in America, having the same etiology, a discussion of which involves a number of facts conducive to the occurrence of this disease in its various forms: acute, chronic, metastatic, fulminating and hematogenous, the last of which occurs most frequently in children, following acute infectious diseases.

Most of the postoperative cases of osteomyelitis coming under my care presented a similar etiologic picture to those described by Round, especially those cases in which preoperative roentgenograms had not been made and which were accompanied by meager clinical data, the absence of which tends to obscure the exciting cause of the infection, and, in certain cases, leads to conjecture as to whether the condition existed immediately before the extraction or was the culmination of baffling diagnosis, faulty surgical technic and indifferent preoperative or postoperative procedures; or a combination of these factors.

Dentists are constantly required to operate in a contaminated field, susceptible to infection from oral flora which cannot be entirely eliminated. The natural resistance of the mucosa of the mouth to bacterial invasion renders most patients immune to aerobic bacteria, but not to the anaerobic type; therefore, every attempt should be made to cleanse the operative field as thoroughly as possible. The mouth should be sprayed with a mild antiseptic solution and then dried and a suitable germicidal agent applied. This should be routine practice in all cases regardless of the type of oral surgery or anesthetic used.

To prevent the possibility of infection from extra-oral sources, all operative armamentarium should be thoroughly sterilized. In modern offices and hospitals where exodontia and oral surgery are practiced routinely, all fabrics such as towels, sponges, dressings and cotton applicators are sterilized in autoclaves and special care is given cutting instruments, handpieces and certain gut sutures. These are usually sterilized in a germicidal solution. Instruments and materials other than those specifically mentioned are thoroughly boiled before use.

CONTRAINDICATIONS FOR INJECTION ANESTHESIA

Where diffuse oral infections prevail, such as acute alveolar abscess, periostitis or acute gum infections such as Vincent's infection of the mandible or maxillae, infiltration anesthesia and certain intraoral block methods of injection are inadvisable, as infection is often carried by the needle into the contiguous soft or osseous tissues. For simple incisions, where drainage is required, a form of desensitizing spray, such as ethyl chloride, will suffice, but for deeper incisions, an inhalation agent that will produce general anesthesia is mandatory for satisfactory results.

From my observation, infiltration anesthesia should not be used on the mandible for cavity preparation or extractions, as the block methods have proved safer. It is my further belief that intraosseous anesthesia, a technic designed for injecting anesthetic solutions into cancellous osseous tissue under pressure, should be dispensed with entirely, as the bony structure of the mandible and the maxillae is devoid of a specific nerve supply. These bones are both indirectly innervated through the periosteum, which is directly supplied by two of the three major branches of the trigeminal

nerve; the periosteum of the mandible by the branches of the mandibular nerve, and the periosteum of the maxillae by the maxillary division and several of its smaller branches.

As no advantage can be gained, and because of the ever present danger of causing myelitis or acute infectious osteomyelitis by this means, the intra-osseous method of injection should be dispensed with.

If block or infiltration methods fail to render complete anesthesia in certain cases, where cavity preparation is desired, or in operating in close proximity to nerve trunks, the operator may find it expedient to use some form of topical obtundent or analgesic, as it is sometimes impossible to completely anesthetize a tooth pulp by injection methods because of anastomosis, weakness of the solutions employed or acute inflammation of the nerves supplying the part.

In the maxillae, it is comparatively safe to use the infiltration method in the absence of acute conditions, at which time the solution should be deposited slowly under slight pressure.

It has rarely been necessary in my practice to resort to infra-orbital anesthesia or a complete block of the second division of the fifth nerve in the average case of maxillary tooth extraction, as infiltration anesthesia usually serves the purpose.

The needle puncture for this method is made high at the juncture of the mucobuccal fold and the gingival tissue. Two or three cubic centimeters of procaine-epinephrine solution deposited close to the operative field on the buccal surface, and 1 or 2 cc. on the palatal side, usually will produce sufficient anesthesia for the average dental operation. It is advisable to use a low epinephrine content in all local anesthetics to avoid shock and interference with the normal blood supply of the injected part, thus minimizing the possibility of infection and its concomitant osteomyelitis from stasis. Procaine reaction can be prevented or minimized by premedicating patients with either nembutal or sodium amytal.

CLINICAL SYMPTOMS OF ACUTE OSTEOMYELITIS OF THE JAWS; TREATMENT

Subjective and objective symptoms of acute infectious osteomyelitis are exquisite pain, indurated edema and trismus. As the infection spreads, there is a rise in temperature, with chills, inflammation of the salivary glands and induration of the soft tissues of the face and neck on the affected side. As the condition progresses, it usually includes the tissues of the throat, and trismus results. A devitalized tooth or a retained root, when the exciting cause of the infection, may be loose and painful to percussion.

An important point in differentiating osteomyelitis from acute alveolar abscess or cellulitis is that cases of acute infectious osteomyelitis are more painful.

In typical cases, three or four days may follow inception of the infection before adjoining teeth or roots become loosened and painful, and during this time there is no roentgenographic evidence of bone destruction. About the fourth or fifth day and sometimes later, there is usually a general reaction associated with high temperature, rapid pulse and a sharp rise in the leukocyte count, due to elevation of the periosteum from the cortex of the affected bone at the point of the original osteomyelitic focus, when the affected condition of the bone can be revealed radiographically. It then has the characteristic punched-out, worm-eaten appearance described in the textbooks.

In severe cases, metastases may occur, involving the heart, kidneys or other vital organs, and sometimes adjacent bones. Patients suffering from incipient osteomyelitis of the jaws or similar conditions should be hospitalized, with a physician

in attendance to care for general systemic disorders that may arise. Rational therapy and conservative treatment coupled with routine intravenous injections of neo-arsphenamine or large doses of sulfanilamide as supportive treatment are advocated when judgment dictates. When sulfanilamide is prescribed, blood counts should be made at least every second day.

Preoperative local therapy includes the application of hot moist compresses to the affected part and gargling of hot solutions to facilitate speedy localization of pus, since early drainage is desirable. Immediate incision or waiting until pointing takes place is optional and should be left to the judgment of the operator.

During the acute stages, when pronounced edema of the throat is evident, or when there are signs of labored respiration, nitrous oxide-oxygen is contraindicated as an anesthetic agent, since acute edema of the glottis may result. Extra-oral subcutaneous infiltration anesthesia or ethyl chloride spray is comparatively safe in these cases and usually quite effective. Curettage is inadvisable as an adjunct in the treatment of acute osteomyelitis. Following incision and drainage of the soft tissues, if the excruciating pain continues in the bone, the cortical plate in the affected region is then punctured by means of a drill, sharp chisel or rongeurs for the liberation of intra-osseous pus and to relieve tension. The wound should be kept open after the initial incision with a loose iodoform gauze pack, cigaret drains or rubber tubing. From this point on, the case is treated symptomatically and it is occasionally necessary to make additional incisions for adequate drainage.

Postoperative local treatment includes maintenance of drainage, irrigation of the wound or wounds, the use of hot compresses on the part, irradiation and oral asepsis. General care consists of rest, proper diet, flushing of the kidneys and keeping the bowels open.

Roentgenographic checks should be made at stated intervals, with frequent laboratory tests, including urinalysis, white blood cell and differential counts, smears and cultures.

From the fifth to the eighth week and at times over a longer period, sequestra form and these should be removed, after which resolution usually proceeds rapidly. It should be borne in mind that, in cases of osteomyelitis, infection of blood vessels and of bone causes sequestration, a chief characteristic of this disease. The affected part slowly detaches itself from the living bone and is definitely demarcated.

The removal of sequestra from the maxillae or mandible often causes facial disfigurement and impaired masticatory function. Fortunately, many of these sequelae can be corrected, especially in the mandible, if there has been no damage to the ascending rami, condyloid processes or the temporomandibular joints. Malocclusion, loss of teeth and certain deformities of the jaw can be corrected by modern dental appliances, unsightly scars can be effaced by plastic methods, and bone loss in the body of the mandible can be restored with osseous grafts for improved function or for cosmetic reasons when necessary.

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ORTHODONTIC SENSE

By Andrew Francis Jackson, D.D.S., F.I.C.D., Philadelphia, Pa.

THERE are three logical orthodontic objectives. Considered singly and in combination, they constitute a natural classification for all dental malocclusion because they present in the simplest and most direct manner the basic problems on which decisions as to treatment must be made.

For a permanent and satisfactory orthodontic result, there must be:

1. A satisfactory proportion of bony development to tooth substance, which can be termed structural balance.

2. An arrangement of the teeth in the bones which will permit a satisfactory excursion of the mandible. This can be termed functional efficiency.

3. A satisfactory proportion and orientation of the dental organs to the other facial factors in order to present a pleasing appearance, which can be termed esthetic harmony.

There is no exact scientific means of measuring any of these conditions. The first and most important feature to be considered is that every individual presents a unique and an enormously complex combination of components. This combination is not only invariably unique as an original set-up, but will also react differently under treatment and have a result which will be not only unique, but also never quite predictable.

This is the basic nature of all biologic processes, and to depart from certain principles of procedure in connection with them is to invite almost certain failure.

An efficiency expert recently made this significant remark: "Whatever your problem may be, think of it in terms of the greatest possible simplicity; then break it up into steps and treat each step separately."

This is good advice for all kinds of problems, but when it comes to problems concerned with the functional activities of living organisms, the step method of procedure is not only a good one, but also the only one which it is possible to pursue at all. There is no choice in the matter. This is just as true in orthodontic practice as it is for such activities as walking, riding a horse, playing a game of golf or any other form of activity concerned with the biologic problems of anatomic form and physiologic function. Success in execution in all of them depends on an inherent or acquired sense of balance.

One of David Starr Jordan's favorite remarks was: "Wisdom consists not so much in knowing what to do in the long run as to what to do next."

Orthodontic treatment is concerned in every instance with some specific individual. The individual is the natural result of his own peculiar heredity and environment. Volumes have been written on this subject, but, for practical purposes, some of the scientific conclusions can be summed up in a few sentences.

Milbourne Stuart, Colgate's first professor of psychology, said to his students a quarter of a century ago, "The ability to reason is the ability to ignore the many things you know about a set of circum-

Read before the Section on Orthodontia at the Eightieth Annual Session of the American Dental Association, St. Louis, Mo., October 26, 1938.

stances and to pick out the important feature. To ignore the nine-tenths and to pick out the vital tenth is what we should strive for."

As a result of scientific investigation and clinical observation, there can scarcely be a doubt that heredity plays the predominant rôle. LeRoy Johnson has shown, by his experiments in cross breeding of dogs, that it is possible to produce individuals with the typical teeth of one parent and the characteristic jaw formation of the other. One of the main causes of present day malocclusion is the hybridization of the human race. This is strikingly so in the American population.

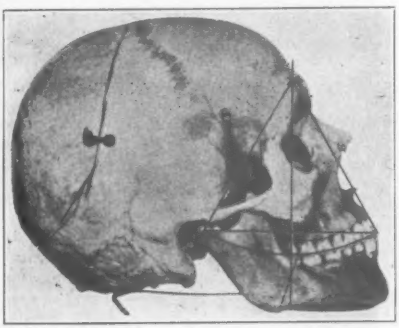


Fig. 1.—Ideal occlusion: structural balance, functional efficiency and esthetic harmony with a complement of thirty-two perfectly proportioned teeth.

Brash says, "Such evidence as we have of the inheritance of face and jaw form all points to the genetic constitution as a primary factor. There is evidence that extreme degrees of malrelations of the jaw and underdevelopment of the mandible are of the nature of real malformations and stand in relation to other regional malformations."

In his book "Apes, Men and Morons," Earnest Albert Hooton, of Harvard University, says,

Among the students of man, there is suspicion amounting to a virtual certainty that the numerous anatomical variants are sorted into racial physical combinations through the activities of certain glands in the body—the pituitary, thyroid, parathyroids, thymus, adrenals and gonads. The secretions of these glands are the regulators of growth and sex differentiation and perhaps of metabolic and other vital processes. These are their real jobs, but they amuse themselves in their spare time by shaping variously the nose and the head, fooling about with the form of the hair, making blondes and brunettes, and otherwise disporting themselves in the fabrication of meaningless anatomical variations.

These ideas as fundamental concepts for the practice of orthodontia not only make any fixed system based on mechanics misleading and inadequate, but also open the door in the most catholic manner for the application at the correct time and circumstance; not only for every method of treatment and type of orthodontic appliance that has yet been devised, but also for combinations of them which, in their individual applications, should tax, to a far greater extent than hitherto, the ingenuity of those who have the temerity to consider themselves orthodontists.

From a purely scientific standpoint, the problems involved in all biologic activities are unbelievably complex, in some cases requiring as a prerequisite for their successful handling the ability to make rapid decisions on the part of those engaged in solving the problems. Some of them by comparison reduce the problems in orthodontics, and the deliberation with which decisions can be considered and action be undertaken, to almost childlike simplicity.

The troubles in orthodontic treatment start when the mind is diverted from the biologic viewpoint to thinking in terms of mathematical formulas concerned with physical laws which are useful in the inorganic sciences, such as engineering and architecture, but which have a very limited and purely relative application to the problems of orthodontic practice.

Owing to the invariable fact that every

case is unique, all information which is based on statistics and the law of averages is purely relative in its value as far as the individual is concerned.

Fig. 2.—Full brother to boy in Figures 4 and 5; same parentage and environment, but different hereditary characteristics; good structural balance, functional efficiency and facial harmony.

Fig. 3.—Dentition of boy shown in Figure 2.

Undoubtedly one of the most crying needs in orthodontics today is that there should be more unanimity of opinion among orthodontists in their basic concepts, principles of treatment and practical methods of obtaining the most desirable results.

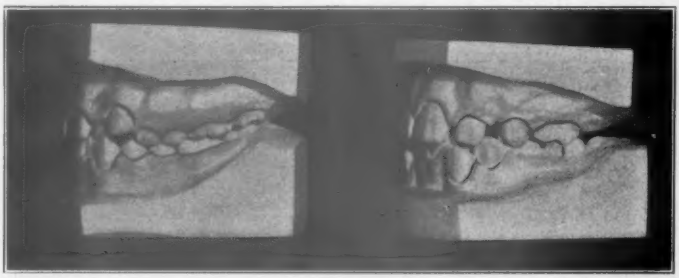
Fig. 4.—Full brother to boy in Figures 2 and 3; poor structural balance, fair functional efficiency and poor facial balance. Compromise was effected by removal of the four first premolars.

Fig. 5.—Dentition of boy shown in Figure 4.

There must be some comprehensive

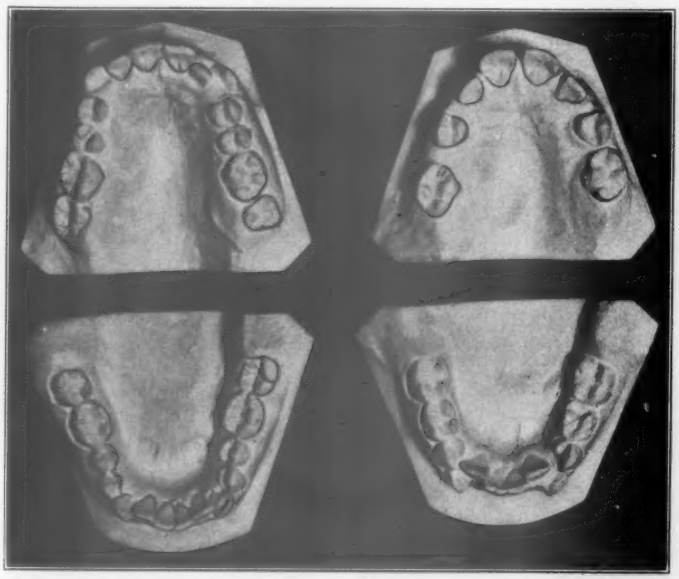
ideas which will by demonstration eventually prove themselves so sensible in theory and sound in principle as to leave no alternative among the methods of clinical procedure. If, for lack of a better method, these could be clearly stated in the form of commonly accepted postulates, we might in time agree on a sufficient number of them to form a basis for a better mutual understanding, and more homogeneous methods of treatment.

As a tentative "starter" along this line of thought, I am presenting, in as few words as possible, some of these for consideration:



A B

Fig. 6.—A, models of teeth of boy shown in Figures 2-3. B, models of teeth of boy shown in Figures 4-5. Figures 6-7 show the great discrepancy in sizes of teeth and jaws notwithstanding the same parentage and environment.



A B

Fig. 7.—A, models of teeth of boy shown in Figures 2 and 3. B, models of teeth of boy shown in Figures 4 and 5.

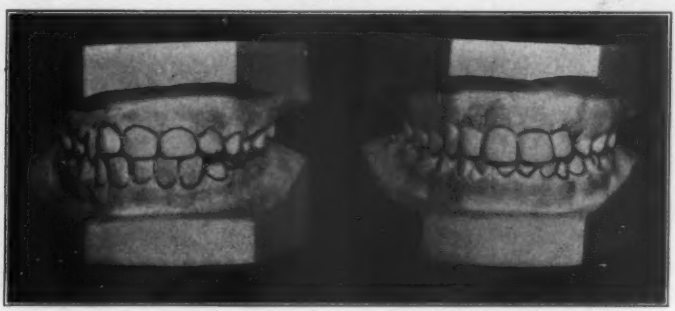
1. Orthodontic practice is concerned in every instance with the structural, functional and esthetic problems of the specific individual, and since he is invariably unique in regard to his biologic qualifications, there is no reason, scientific or otherwise, why he should conform to any specific model, or even come within the range of the average of a satisfactory group.

2. "There is no direct relation between the teeth and the sizes of the jaws." (Brash.)

3. The individual factors to be considered are:

a. The proportion of tooth substance to an estimated amount of bony development at maturity (structural balance).

b. The orientation of the denture as a whole to the skull to permit a satisfactory



A B

Fig. 8.—A, result of several years' treatment in an effort to mechanically overcome a genetic disharmony in structural proportions. B, result of removal of four premolars and natural tissue readjustment without mechanical interference.

A B

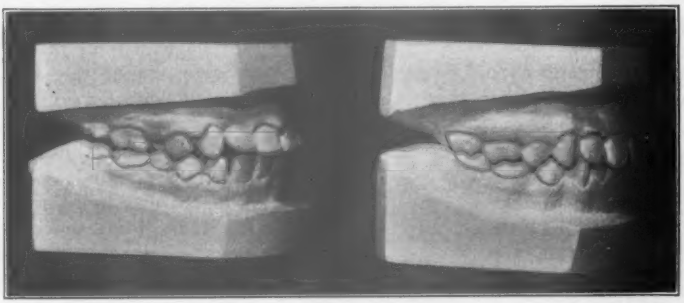
Fig. 9.—Occlusal views of models A and B, Figure 8.

excursion of the mandible (functional efficiency).

c. The relations and proportions of the dental organs to facial factors (esthetic harmony).

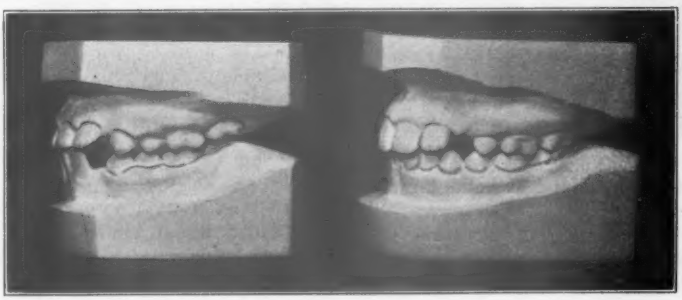
d. The estimated proportion of alveolar process to the maxillary and mandibular bones.

e. The congenital or otherwise absence of teeth.



A B

Fig. 10.—Right side of models A and B, Figure 8.



A B

Fig. 11.—Left side of models A and B, Figure 8.

f. The presence of supernumerary teeth.

g. The possible presence of cystic formations.

h. The age at which treatment is most desirable.

i. The length and continuity of treatment.

j. The histologic nature of the bone to be treated.

k. The muscular and mental development and reactions of the patient.

l. The selection of the most desirable method of procedure for each successive step in treatment.

4. The first step in treatment can best be determined by directing the patient to occlude the jaws in as nearly as possible the position which Rogers has so aptly called "mechanical advantage" and, in that position, noting the interference that may prevent the patient from doing so habitually. This procedure will usually disclose the actual conditions so obviously that the first step in mechanical interference will usually suggest itself as a logical sequence.

5. As physical action is always followed by reaction and accompanied by interaction, a complete re-evaluation of

the factors involved should be made at each visit of the patient to determine the next step, and this procedure should be continued throughout the entire length of treatment.

6. The relationship of the jaws should always be considered from the standpoint of a unit, and individual movements of the teeth in one jaw should never be undertaken without careful calculation for compensatory and complementary movements of the teeth in the opposing jaw.

7. These movements should always be carried on simultaneously so that at all

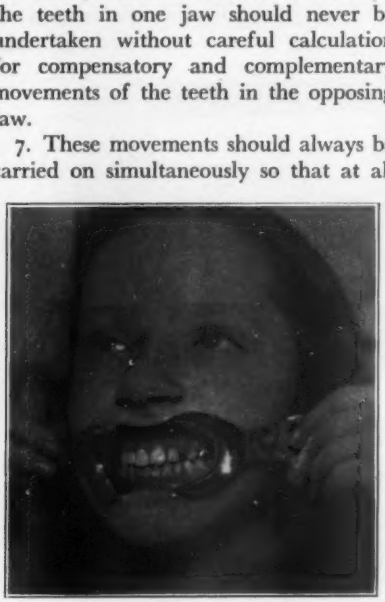


Fig. 12.—Structural and facial balance resulting from treatment described in Figures 8 to 11.

times during treatment, there will be a minimum amount of trauma.

8. All rearrangements of the tissues should be considered simultaneously from the vertical, sagittal and horizontal planes.

9. Mechanical interference should be accomplished by means of appliances so devised as to:

a. Stimulate growth and development and cause changes in form by artificial force best suited to the physiologic factors involved in cell changes.

b. Produce changes in form as a result of changes in function from induced muscular and mental reactions.

10. As mechanical interference is performed on vital tissue, the intelligent cooperation of the patient is one of the most important forces to be enlisted.

11. There is not a single point in the anatomic structure that can be used as a definite landmark in relation to the teeth as a basis of diagnosis as they are all subject to constant changes in orientation, due to functional activities and mechanical interferences during treatment, as a result of which all methods of a gnathostatic or engineering nature, although helpful, are of a purely relative value. Orthodontia is concerned with the varying structural forms and functional activities of the individual.

12. All mechanical interference results in changes in the histologic structure of bone, which vary greatly as to individuals, and the changes desirable should be accomplished within certain time limits exceedingly difficult to estimate. In this particular, periods of noninterference are desirable in order to permit normal tissue readjustments.

13. The limit to which artificially induced bone changes may be successfully carried can be determined to a great extent by a careful study of the apical bases of the teeth to be moved. Changes which are so great as to cause alveolar destruction, root resorption, impaction and facial disfigurement are of no advantage. Neither is there any advantage in treating cases interminably with appliances so inefficient that results are negligible.

14. The final objective of orthodontic treatment is to produce in the oral and related tissues a permanent condition of structural balance, functional efficiency and artistic harmony.

15. These three conditions, with the infinite combinations, constitute a natural classification for malocclusion because they are concerned with the basic problems upon which the decisions in treatment must be made.

16. In some cases, the congenital absence of teeth, the extreme misplacement of certain teeth and other factors are such that obviously not only is an ideal occlusion, but also a satisfactory occlusion, impossible of attainment.

17. As long as the orthodontist has obtained the optimum which the individual factors permit, he has done his full duty to the patient. Just what this is it is extremely difficult to determine, since individual factors make fixed standards impossible, but the application of ordinary common sense, in a careful study of individual details in their relative importance as a composite whole, is often all that is needed to indicate quite clearly what may be estimated as the most desirable individual objective.

Figure 1 illustrates, as a control and for comparison, a case of ideal occlusion. The arrangement of the teeth is so generally accepted as ideal that no comment is needed. The orientation of the teeth to the skull as a unit is open to debate, but it would seem that an arrangement which places them on a segment of a sphere, as illustrated, is about the most satisfactory to permit nontraumatic excursions of the mandible. The median-sagittal, horizontal and vertical planes are all purely relative to other anatomic landmarks.

Figures 2 to 7 illustrate the cases of two brothers who had the same parentage and environment. The word parentage is used advisedly because, from the standpoint of genetics, parentage and heredity are two different things (according to Dr. Detlefsen). In one case, the boy has medium size teeth and proportionately well-developed jaws. In the other case, the teeth are actually much larger than the brother's, with a proportionately poorer development of the bones and muscular facial balance. Apart from some rearrangement of the teeth in both cases, the problem in the case of the boy with the larger teeth was a question of obtaining satisfactory structural balance and esthetic harmony. The extraction of the four first premolars was decided upon, with the results shown. The wisdom of this procedure is open to debate,

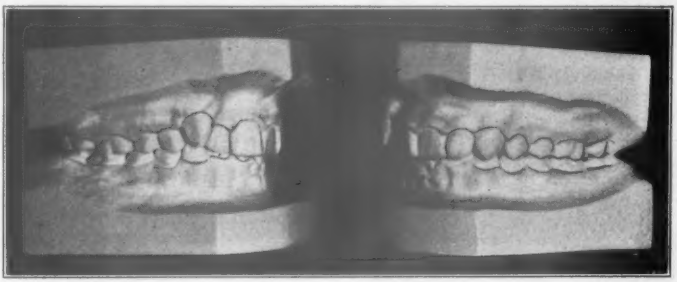


Fig. 13.—A case of unilateral distoclusion, with crowding; showing unsatisfactory structural balance and poor functional efficiency.

If poor judgment is used in this matter, no amount of mechanical work will do any good, and positive harm may result.

18. In many cases, a satisfactory structural balance can be obtained only by the extraction of teeth, and sound judgment in this matter is one of the most essential elements of treatment.

A few case reports are here presented to illustrate some of the points which have been enumerated. As every case has unique features, the only value of case reports lies in the virtue of showing certain principles of treatment which are applicable to all cases.

but clinical evidence is overwhelming as to the soundness of one of Brash's most important conclusions, that "there

Fig. 14.—Labial appliances used in treatment of case referred to in Figure 13.

Fig. 15.—Labial appliances used in treatment of case referred to in Figure 13.

is no necessary relation between the teeth and the sizes of the jaws."

Figures 8 to 12 illustrate a case which was referred for consultation in November 1936. At that time, the patient had been under orthodontic treatment for a considerable length of time, presenting at the time the condition illustrated in Figures 8A to 11A. The appliances were of the rigid variety, with many teeth banded. After a study of the case from all angles, with particular reference to postulates 1, 2, 3, 12, 13, 17

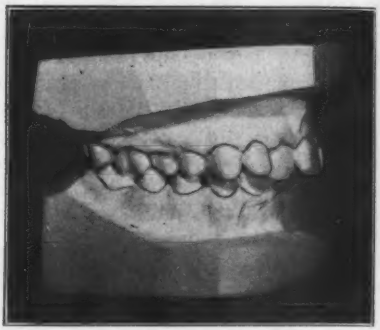


Fig. 16.—Mutilated case showing poor functional efficiency due partly to unsatisfactory overbite.

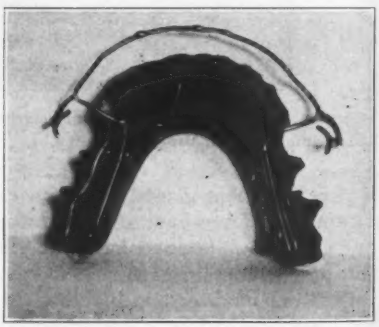


Fig. 17.—Bite plane used in treatment of case referred to in Figure 16.

and 18, extraction of the two right second premolars and the left first premolars was recommended, with the advice that the case be left alone for the next year or two to permit natural tissue readjustments. This advice was followed, with the result shown in Figures 8B to 11B and

12. Recently, a lingual arch appliance with auxiliary springs was inserted to create a slight amount of extra space to accommodate the upper left canine.

Fig. 18.—Result of treatment of case shown in Figure 16.

Fig. 19.—Bite-plane in mouth of case shown in Figures 16-17.

Figures 13 to 15 illustrate a case of unilateral distoclusion and crowding. This type of case is particularly useful in showing the merit of postulate 4. It is absolutely impossible to determine other than by careful oral examination just what picture the case will present when the patient places the teeth in the position of "mechanical advantage." In cases of this kind, the patient has to swing the jaw over from the side in distoclusion to

Fig. 20.—Great lack of alveolar bone with crowding; extreme displacement of mandibular left canine. (Possibly one of Hooton's "meaningless anatomical variations.")

Fig. 21.—Result of compromise treatment of case shown in Figure 20.

the side which is in correct mesiodistal relation, and, in doing this, he usually demonstrates that some of the teeth on that side are the ones which are interfering with the correct occlusion of the jaws. In this case, the labial horizontal movement of the central incisors, which were also interfering, was accomplished by the use of labial auxiliary springs. After this was done, a lingual bite-plane was inserted to maintain the position of these teeth, and, at the same time, cause a change in the position of the jaws (postulates 9 and 10).

Auxiliary springs were employed to move the left lateral incisor and first upper right premolar into line and create the room necessary for the upper right canine. In conjunction with this, intermaxillary elastics were used on the right side. In addition to drawing the mandible bodily over to the left, the elastics also caused some distal movement of the upper first right molar. Recurved Crozat springs were then soldered to the upper lingual arch appliance to move the upper first and second right premolars distally into correct mesiodistal relation with the lower.

Figures 16 to 19 illustrate a case in which an adjustable bite-plane retainer, fully described in previous articles, played a very important part in treatment, particularly in obtaining the satisfactory overbite seen in the facial view. The ability to devise appliances which will simultaneously effect changes in the vertical and horizontal planes is one of the greatest assets in treatment. Figures 17 to 19 show the bite-plane which was used, both in and out of the mouth. An auxiliary spring protruding through a small hole in the vulcanite at the cervical margin of the upper central incisor served to keep this tooth from returning to its former position.

Figures 20 and 21 illustrate postulates 3 (e and j), 16 and 18. This case had also had previous unsatisfactory treatment. Although about three times the usual amount of pressure was employed to move the teeth, results were very negligible. Careful study of the positions of the teeth and the jaw formation pointed to the fact that this was one of those cases in which the teeth themselves seemed to be embedded in the basal bone itself. Several teeth were extracted to effect a desirable compromise, the result of which is shown in Figure 21. It will be noted that the left mandibular canine lies at an unsatisfactory angle between the left mandibular central and lateral incisors. The position of this tooth might be listed among Professor Hooton's "meaningless anatomical variations," although it is questionable whether this could be proved.

An endless number of case reports would only prove that every case has peculiarities of its own which defy any classification other than one along very broad comprehensive lines.

Medical Arts Building.

A SUMMARY OF REPORTS AND A BACTERIOLOGIC STUDY OF INFECTIONS CAUSED BY HUMAN TOOTH WOUNDS

By MARGARET N. BARNES, B.S., and BASIL G. BIBBY, B.D.S., Rochester, N. Y.

TO draw the attention of dentists to the dangers and far-reaching results of human bite wounds, or, perhaps more accurately, wounds caused by human teeth, it seems worth while to summarize the records of infections caused in this way and to present observations on the subject. To reach a more definite conclusion regarding the etiologic factors in these conditions, particular attention will be paid to the divergent bacteriologic studies of the consequent infections.

That human bite infections are more common than is generally realized is evident not only from reports in scientific journals, but also, within the last year, from several comments in the popular press and from verbal reports of several additional cases. Although all human bites do not result in infectious processes, it is the opinion of most observers that they are more dangerous than those of animals. For example, in a comparison of the results of different bites, Dimtza (1933) concluded that, except for those of the cat, human bites are more to be feared than those of dogs, horses, mules or bears. However, from a study of 781 cases of human, cat, pig, cow and rat bites, Hudacsek (1935) decided that human bites are not so serious as those of animals.

The most common cause of bite wounds is fighting in which fists are cut by striking the teeth or in which actual biting takes place. Cases arising from sexual practices are not uncommon. Hand infections resulting from patients' bites are reported in a doctor and in a dentist. A case is recorded where nail-biting caused serious infection in a child. In another, a self-inflicted bite caused lip infection. Most commonly, the hand is affected. Infectious processes originating in minor cuts creep up the arm, despite heroic methods adopted to check their progress. They sometimes result in extensive tissue destruction, sepsis and even death. These severe consequences have called forth a number of reports in medical literature. Seventeen such reports have been found. These cover a total of 341 cases, of which fourteen required amputation and four terminated fatally. A summary of these cases and a case on which we have carried out bacteriologic studies is presented in Table I.

The clinical course of these bite infections is remarkably constant in most cases. Typically, to quote Welch (1936):

> The impact of the tooth produces a laceration over the knuckles of the index or middle fingers. It is tiny but deep, frequently penetrating the extensor tendon and usually entering the joint. The patient notes little

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The study upon which this report is based was made possible by funds granted by the Carnegie Corporation of New York. However, the Corporation is not to be understood as approving, by virtue of its grant, the views expressed herein.

TABLE 1.—SUMMARY OF REPORTS AND BACTERIOLOGIC FINDINGS IN INFECTIONS FROM HUMAN TOOTH WOUNDS

Author	Date	Cases Reported			Bacteriologic Findings					
						Pus			Blood	
		Total	Deaths	Amputations and Joints Destroyed	Number Studied	Smears	Aerobic Cultures	Anaerobic Cultures	Number Studied	Cultures
Hultgen	1910	1	0	0	1	Fus., spir.*				
Peters	1911	2	0	0	2	Fus. (2), spir. (2), strep. (1), bac. (1), cocci (1)		Cocci, fus.		
Hennessy & Fletcher	1920	1	0	1	1	Fus., spir.				
Pilot & Meyer	1925	1	0	0	1	Fus., spir., cocci, diph.	Strep. (hemolytic)			
Owen	1928	28				Syphilitic spir. (14), non-syphilitic spir., (9)				
Fuller & Cotrell	1929	1	0	1	1	Fus., spir.				
Flick	1929	1	1	0	1	Spir.	Staph. albus		1	Neg. (aerobic & anaerobic)
Bower & Lang	1930	1	0	0	1	Spir., fus., cocci		Cocci, fus.		
Frankenthal	1930	1	0	0	1	Strep. staph., bac. (gram-pos.)				
Mason & Koch	1930	13	0	0	7	Staph., strep., etc.	Staph. albus (2) Staph. aureus (1) Strep. salivarius (1), Prot. vulgaris (1)	Fus. (1), strep. (hemolytic) (1), bac. (gram-neg.) (1)		

Bates	1931	100	0	1	?	No fus. & spir.	Staph. albus, Staph. aureus, Strep. viridans, B. subtilis			
Flick	1932	1	0	1	1	Cocci & bac. (surface), spir. (deep)				
Dimtza	1933	4	1	1	?		Strep., staph., Bac. coli		?	Strep.
Hudacsek	1935	37								
Lowry	1936	122	2	3	?	Spir., fus., cocci		Strep.		
Welch	1936	18	0	6	14	Fus., spir.	Strep. hemolyticus (2), Strep. viridans (3), strep. (non-hem.) (4), staph. (4), bac. (gram-pos.) (2)			
Smith & Manges	1937	9	0	0	1		Staph. albus, Staph. aureus	Fus.		
Barnes & Bibby	1938	1	1	0	1	Cocci (gram-pos. & gram-neg.), bac. (gram-pos.), fus.	Staph. (atypical)	Cocci (gram-pos. & gram-neg.), bac. (gram-pos. & gram-neg.), fus.	1	Cocci (gram-pos.)
Total: 18 reports	1910–1938	342	5	14	33					

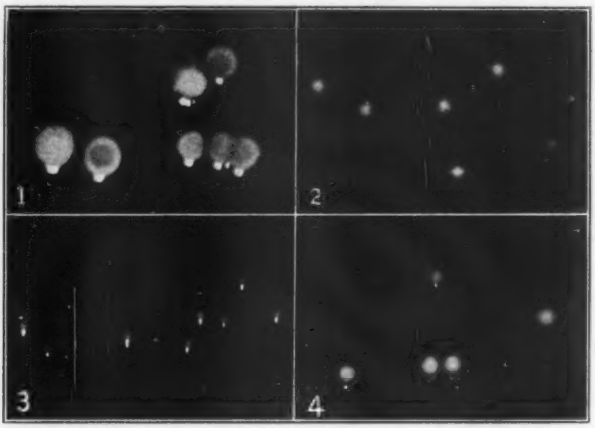
*Abbreviations: Fus., Fusiform bacilli or fusiformis.
Spir., spirochete or treponema.
Strep., streptococci.
Staph., staphylococci.
Bac., bacilli or bacteria.

discomfort for from six to twelve hours. Then the dorsum of the finger and hand swells, and a dusky red color appears. Soon a thin, gray, malodorous discharge begins to run from the wound. Pain on movement of the finger indicates the progression of a septic arthritis. The patient develops moderate fever and malaise, and finally appears in the hospital three to four days after his injury. At this time the whole dorsum of the hand is found to be swollen and red. Pus, similar in odor to that of a lung abscess, exudes from the laceration on pressure either about the knuckle or on the anterior surface of the metacarpophalangeal joint. Motion of this joint is restricted and painful. No extension of sepsis is found distally along the finger, nor is there any indication of infection on the volar surface. Lymphangitis is not usual, but may be present. There is a temperature of 100° to 102°, and the patient complains of chilliness and headache. The white cell count is variable, but may be as high as 25,000. An x-ray of the finger at this time is negative.

He states that in favorable cases surgical intervention brings relief and the temperature drops, and he continues:

The purulent discharge gradually diminishes and finally the incision closes by secondary intention in two to three weeks. Very commonly, however, about a week after the initial drainage, the amount of pus increases and the temperature begins to rise slightly. An x-ray shows arthritis with osteomyelitis of the proximal phalanx and of the head of the metacarpal. Further drainage of the joint may result in improvement, but usually amputation of the finger and head of the metacarpal is required.

There is much less agreement on the bacteriologic aspects of bite infections. From a review of the literature, it appears that less than forty of the 341 reported cases have been subjected to bacteriologic study at the hands of the seventeen authors. None of these investigations include aerobic and anaerobic cultures from both the wound and the patient's blood. In smears from the suppurating wounds, thirteen of seventeen investigators observed fusiform and spirochetal mouth organisms; whereas gram-positive cocci were reported in six and gram-positive bacilli in two instances.



1, colonies of coccus M_3, isolated from pus, grown anaerobically for five days on rabbit-blood agar. (×14.) 2, colonies of coccus M_4, isolated from pus, grown anaerobically for five days on rabbit-blood agar. (×14.) 3, colonies of coccus M_5, isolated from pus, grown anaerobically for five days on rabbit blood-agar. (×8.) 4, colonies of coccus M_b, isolated from blood stream, grown anaerobically for five days on rabbit blood-agar. (×12.) On aerobic growth, the colonies resembled those of coccus M_3.

Only ten of the papers contain accounts of cultural studies, which include seven aerobic and six anaerobic series. In aerobic cultures, streptococci and staphylococci of different types were found most frequently, but gram-positive bacilli and proteus strains were also recovered. In the anaerobic cultures, fusiform bacilli and gram-positive cocci were uniformly present. One of two attempts to cultivate organisms from the blood stream was successful, producing a culture of streptococci.

TABLE 2.—PROPERTIES OF COCCI ISOLATED FROM PUS, BLOOD STREAM AND HUMAN MOUTHS

Source of Organism	Strain	Anaerobiosis	Gram Stain	Growth at 45°	Growth at 8°C.	Douglas' Broth	Gas in Deep Meat	Gelatin Liquefaction	Indol Formation	Nitrate Reduction	Glucose	Sucrose	Maltose	Lactose	Salicin	Manitol	Final *p*H
Pus	M3	Facultative	+	++	+	T	−	+	+	−	A	A	A	A	−	−	6.1
Pus	M4	Facultative	±	+	++	T	−	−	+	++	A	A	A	A	A	−	5.4
Pus	M5	Obligate	−	+	++	G	−	−	±	++	−	−	A	−	−	−	7.7
Blood	M_b	Facultative	+	+	++	T	−	−	+	+	A	A	−	−	−	−	6.3
Mouth	2/1	Facultative	±	+	++	T	−	−	+	−	A	A	A	−	−	−	5.9
Mouth	24	Facultative	+	++	++	G	−	−	+	−	A	A	A	A	−	−	5.5
Mouth	19	Facultative	+	++	++	T	+	−	+	−	A	A	A	A	A	A	6.6
Mouth	1	Facultative	+	+	++	T	−	−	++	±	A	A	A	A	A	A	6.4
Mouth	9/5	Obligate	−	++	++	G	+	−	±	++	−	−	−	−	−	−	7.6

None of the strains hemolysed blood.
+, evidence of growth on microscopic examination; positive reaction.
++, evidence of growth on macroscopic examination; strongly positive reaction.
±, gram-positive and gram-negative stain; doubtful reaction.
T, turbidity in broth.
G, granularity in broth.
A, acid formed.

Because of this unsatisfactory understanding of the bacteriology of bite infections, careful bacteriologic studies were made of a case which followed an essentially typical course in the Department of Surgery of Strong Memorial Hospital.

REPORT OF CASE*

A young man, seen February 21, showed a marked contusion, swelling and tenderness about two small shallow ragged lacerations on each side of the middle knuckle, which he stated had been injured in a fall. Local treatments gave no relief, and after two days the wounds were ragged and edematous and the extensor tendon was sloughing. The patient had a fever and a white cell count of 29,000. It was now admitted the wounds had been incurred by striking a tooth in a fight. Neoarsphenamine, zinc peroxide, prontylin and blood transfusion were employed without benefit. The white cell count reached 37,300 and the red cell count dropped to 1,630,000. Fever and chills alternated, signs of kidney and liver involvement appeared and the patient became drowsy and incoherent, death ensuing April 2.

*Norman Egel, M.D., furnished the case history and assisted in obtaining specimens for bacteriologic study.

BACTERIOLOGIC FINDINGS

Eight cultures of the pus were made by routine laboratory methods. Aerobically, these showed three cultures of staphylococci, two unidentified gram-negative bacilli, one unidentified gram-positive coccus and one negative culture. Anaerobic plates were negative twice and on four occasions showed an unidentified

gram-negative bacillus. No organisms were isolated from five blood cultures.

In our own cultural studies, methods used in previous work on oral bacteria were employed. In all, three detailed examinations were made of the pus and three of the patient's blood, the former over a period of a month and the latter during the two weeks preceding death. In smears of the pus, gram-positive cocci were always present, predominating in the first two smears. A few irregular gram-positive rods appeared in the first and second, and occasional fine gram-negative bacilli in the last two smears. Gram-negative cocci were present in the last smear. Aerobic cultures of the pus showed only gram-positive cocci, which in structure and colony form seemed to be atypical staphylococci. Anaerobic cultures showed a variety of organisms. Gram-positive cocci of three types and gram-positive irregular bacilli predominated, the latter being the most numerous in the first culture. Gram-negative bacilli, gram-negative and indefinitely staining cocci and two types of fusiform organisms also appeared in smaller numbers. It is interesting to note that all of these anaerobic organisms resembled types previously isolated by us from the mouth. (Knighton and Bibby, 1933; Bibby, 1934, 1936; Bibby and Knighton, 1935.) Intramuscular injections of pus into guinea-pigs produced small abscesses in three days. Smears of the pus showed gram-positive cocci and a few gram-negative cocci and rods. Reinoculation of this pus or cultures from it caused no pathologic changes in other guinea pigs.

Blood smears were questionable up until a day before the patient's death, when gram-positive cocci were seen. At the same time, aerobic cultures of the blood showed no growth. All three anaerobic cultures yielded only gram-positive cocci of like structure, growth characteristics and biochemical properties. Guinea-pigs and mice were not affected by intraperitoneal injections of the patient's blood.

The irregular occurrence of different organisms in aerobic cultures from the pus suggests that such types had little, if any, etiologic significance. Therefore it serves no useful purpose to describe all of them in detail. It is sufficient to mention that most of them were recognized as types which we have isolated from the mouth at various times, but of which a satisfactory classification is still lacking. However, in view of the constant appearance and general predominance of several anaerobic coccal types, and the repeated isolation of a coccus in anaerobic cultures from the blood stream, a special significance attaches itself to these types. For this reason, the cultural characteristics of these persistently appearing pus cocci (M_3, M_4, M_5) are listed. (Table 2.) Colonies of these organisms are shown in the accompanying illustration.

The organism isolated from the blood stream was a gram-positive coccus about 0.5 in diameter, usually occurring in pairs, though sometimes singly, in short chains or clusters. Growth in Douglas' broth was uniformly turbid. Colonies on rabbit's blood-agar, as shown in the illustration, were about 0.5 mm. in diameter, nonhemolytic, round, smooth, grayish white and slightly raised at the periphery. At first, the organism was an obligate anaerobe, but after several subcultures, it grew aerobically. A summary of biochemical properties of the blood coccus (M_b) is given in Table 2.

To give some indication of the source of the blood coccus, anaerobic cultures were made from about the incisor teeth of forty persons. (Because of fear of legal proceedings, the person whose teeth had caused the hand wound in the case reported would not submit to having cultures made.) Although a great many strains of organisms, morphologically and culturally similar to the blood or pus types, were encountered in the original

cultures, only a few grew well on subculture. Details of representative culturally established strains showing characteristics comparable to the blood or pus organisms are given in Table 2. Only one of these (2/11) closely resembled the blood type. Although other mouth types often showed similarities in colony forms, their biochemical properties differed more widely from those of the blood coccus and, as may be seen from their tabulated characteristics, some of them bore as close resemblance to it as did two of the pus types (M_3 and M_4).

COMMENT

The finding, in the blood stream, of what may be regarded as a member of the poorly defined group of anaerobic streptococci is in keeping with previous bacteriologic findings in various persistent infections. Prèvot (1925) gives the fullest description of such organisms. He identified six different micro-aerophilic and anaerobic coccal types in cultures from cases of pulmonary gangrene, bronchial dilatation and puerperal fever. In its oxygen requirements, our blood organism resembles his *anaerobe de prédilection,* but in its other characteristics, it is closer to some of his other types. The fact that none of the organisms described by other workers can be identified with ours serves to emphasize the paucity of the knowledge in this field. However, our culture series indicates that the anaerobic streptococci are fairly common in human mouths.

The possibility that anaerobic cocci are important in gangrenous and other infections is suggested in several reports. Thus, Davis and Pilot (1922), in a study of gangrenous pneumonia, concluded that anaerobic cocci were the aggressive agents which invaded the blood stream while the concomitant fusiform bacilli and spirochetes remained localized. The invasive rôle of anaerobic cocci in symbiosis with other organisms is supported by Smith (1927) and Meleney (1931). The tendon sheath infections studied by Meleney are of particular interest because of their close resemblance to bite infections. Indeed, it is possible that implantation of organisms in the joint capsule or tendon sheath by traumatic injury may be an essential link in the sequence giving rise to the characteristic manifestations of bite wound infections. Further evidence of the importance of anaerobic and micro-aerophilic cocci in persistent infections is offered by Schottmuller (1910), Prèvot (1925), Colebrook (1930), Colebrook and Hare (1933), Meleney (1935) and Meleney and Johnson (1937).

In view of the foregoing evidence and the findings in the fatal case of human bite wound infection reported here, it appears that mouth organisms, such as the anaerobic cocci, together with other types may give rise to intractible suppurative processes which may cause serious tissue destruction, septicemia or even death.

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A CONSIDERATION OF IMPORTANT PHASES OF EXODONTIA PRACTICE AND TECHNIC

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DENTISTRY AS A SCIENTIFIC PROFESSION

ONE general observation I should like to make concerns the relation of our separate, individual practices to the ideal of dentistry as a science and as a profession. In the year 1940, the profession of dentistry will be one hundred years old. There are still, however, certain aspects of its methods which would seem to make it more of a craft than a profession or a science. This condition is not due to a weakening of morale after the dental graduate leaves his training and becomes engrossed in the personal problems of family life: It is, I believe, attributable to the fact that our dental school education may tend to narrow instead of broaden us, and, further, to the fact that our scientific and professional breadth is determined largely by what we learn in practice rather than what is taught in the dental school.

For example, in all of the schools of dentistry, there are skilled professors of exodontia and oral surgery. In fact, they are so good that they tend to narrow us, for the reason that if we learn from Professor Jones or Professor Smith, each of whom may be world-famous for his particular technics, we take the obvious short cuts by learning those technics instead of applying the broad scientific wisdom out of which Professor Jones or Professor Smith has created his fame. I do not wish these great professors to be less eminent or less individual in their personal methods. I do believe, however, that we deprive ourselves of the highest type of professional and scientific gratification when we follow the short cuts and become a "Jones man" or a "Smith man."

Dental education is now sufficiently aged and tested to be thoroughly scientific and professional. The soundness of its various principles has been tested in millions of special cases; and from these data, truths can be organized. Is it asking too much to urge that our pro-

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fessional institutions organize certain established and standard principles of exodontia and oral surgery which have been proved beyond a doubt, and that these principles be taught by the professors and be accepted as fundamental by all practitioners? I should like to see the special short cuts, methods and technics of our ablest professors made available to every student and practitioner, so that, instead of restriction, competition and even controversy, we may achieve breadth, flexibility and understanding. Each method has its own good qualities; likewise, each method has its own limitations. Such limitations and competition belong to trades and crafts, not to scientific or learned professions.

We all know that we have to deal with patients instead of teeth. The highest professional practice is that which treats individual cases as such. We cannot apply a certain professor's technic to all patients, even when the existing conditions are very similar. In practically every case, there is a choice of method; and the highest professional responsibility is to give the best of many methods, rather than be restricted to some old standby method which Professor Jones or Professor Smith has taught us. Oftentimes, the simplest procedures are the best; in most cases, the best surgeons practice the least surgery. When, however, extensive surgical procedures are indicated, many unforeseen complications arise during the operation and later. The man who knows only his professor's short cut will fail if he cannot meet the problems which his professor's system did not completely cover.

Of course, it is true that we learn by doing. My point is, however, that our experience should serve other dentists as well as ourselves, and that by expanding the base of our educational principles on scientific and demonstrable knowledge, we can escape from individual limitation and establish a still higher professional standard.

SURGICAL TREATMENT OF PYORRHEA

My own experience and observation on the application of surgical principles to the treatment of pyorrhea have led me away from special technics and points of view. I am now, I believe, in the middle of the road. In the field of surgical treatment of pyorrhea, I have noted a tendency toward radical practice on the part of some of the ablest oral surgeons. At first, the surgical treatment of pyorrhea was offered for those cases which were beyond the scope of the usual conservative methods. Previous to the vogue of surgical treatment of pyorrhea, teeth which were beyond the hope of conservative treatment were generally extracted. With the advent of surgical treatment of periodontal disease, some hope was held out for these teeth. Of course, conservative oral surgeons quickly saw that surgical treatment of pyorrhea should be limited to certain types of cases. During the past five or six years, my observations have completely justified this point of view; but operators who have become skilful and even famous in the surgical treatment of pyorrhea have shown a tendency, all too human, to extend its application far beyond the boundaries of scientific indication. They perform the operation so well that they are tempted to employ it too frequently. There seems to be no particular glory in the old, often painful, conservative scaling treatment; but is it not more scientific, if not more humane and ethical, to use a conservative method rather than a radical one if the same successful result may be obtained? The occasional striking success of surgical treatment sometimes confuses the issue. I am, indeed, definitely of the opinion that the surgical treatment for individual pockets is a sound procedure, and that this, coupled with conservative scaling and the elimination of traumatic occlusion, can preserve certain teeth.

The indications, however, for complete surgical treatment of pyorrhea are few and far between, and I am sorry to say

that I have observed operators who, because of their marked ability, have been extremely radical in cutting into cervical tissue which was not diseased and which would have probably responded to proper mouth hygiene and brushing. I have grown suspicious of enthusiasts who advocate surgical treatment for all types and forms of pyorrhea.

Radical surgery is only one of the many agencies at our hands, and we must be wise in its use. Its use falls between two extremes: where scaling and grinding are indicated, and where extraction is best. To postpone an extraction obviously demanded in order to practice brilliant periodontal surgery is cruel, if not unethical.

Study and discussion of this problem are necessary before standard, scientific diagnosis and treatment can be achieved, but surely this goal is worth our striving.

REMOVAL OF TEETH AND GENERAL ANESTHESIA

Exodontists are today faced with a new problem, because dentistry has won a victory over fear and prejudice in the lay mind. Contrary to the situation a generation or two ago, people are no longer afraid to have teeth removed. Improved methods, new anesthetic agents, greater consideration of the mental attitude of the patient all have won for us a victory, and with it a new professional responsibility. The average adult patient walks into any dental office without hesitation or fear, asks for "gas" and says he wants one or more teeth extracted. We must not respond to this pleasing overconfidence. Without alarming the patient, we would do well to remember that often an extraction is a very serious matter—frequently more dangerous than an appendectomy. Some of you are probably saying to yourselves that I am exaggerating a bit; that what I have to say applies to a very small percentage of cases. I wish that some of you could accompany me on my almost daily trips to hospitals where dangerously sick people are fighting for life against cellulitis, osteomyelitis, complications from heart and lungs, surgical shock and other hazards which lurk behind every tooth extraction. The patient's initial overconfidence, when added to by the dentist who has been, up to that time, very lucky in not having disaster follow his ready use of forceps, must sometimes demand a fearful price. Patient and dentist are willing to proceed with a general anesthetic, without any preliminary examination or physical check-up. The same patient does not think preliminary checks and tests at all strange when a physician makes them before a tonsillectomy or appendectomy.

Is the patient to be blamed for this? I think that the dentist must meet a professional responsibility. As long as he is willing to take a chance and extract promptly, failing to assume a medical attitude of precaution, hoping to get a low fee for quick work and fearing that the patient will go to some one else if expensive time is spent in examination—in other words, as long as the dentist uses a trade technic instead of a professional technic, he is to blame for these unforeseen hazards of tooth extraction.

Further, I do not believe that any dentist should give a general anesthetic to a strange patient until a heart and chest examination has been made, and, in some instances, a urinalysis. I can hear some of you say, "But I don't know anything about the heart and chest. Even if I were to listen to a heart, I doubt very much whether I could detect abnormal heart sounds."

Perhaps this is true of some of the older practitioners, but it certainly is not necessary in the case of the younger graduate. After all, a medical student receives very little instruction regarding the use of the stethoscope while in medical school. The time required for instruction along this line in a medical school can very easily be provided for

in the present course in the dental school, without any additional burden on the student. It is during the medical student's hospital internship that he receives his broadest clinical training in listening to heart and lung sounds. Since many dental students from Class A schools are today taking dental internships, I see no reason why a dentist cannot take advantage of his internship to listen to normal and abnormal heart sounds. While he is in the hospital, this can very easily be done, and, at the same time, he will have the advantage of supervision from competent authorities.

After such basic training, it is simply a matter of routine examination of all patients, and within a very short time, the dentist develops an ability to distinguish between the diseased cases and the healthy cases. Even if he were only 90 per cent efficient, he would be better than he is today under our present system. This is merely one more way in which we can raise the practice of dentistry toward the ideal of a scientific profession.

I do not suggest that the dentist encroach on the province of the physician. My purpose in stressing this additional training for the dental practitioner is to enable him to cooperate more intelligently with his professional colleagues in medicine. When the examination made by the dentist arouses his suspicion that a systemic disease or dysfunction is present, he should seek consultation with a competent physician. Intelligent and whole-hearted cooperation of different branches of the healing art is the patient's best insurance of professional service.

SELECTION OF THE ANESTHETIC AGENT

I am using general anesthesia more today than ever before. Whether it is a so-called simple tooth extraction or the removal of an extensive sequestrum from the jaw, I prefer, when possible, to do my work with the patient asleep. I have the feeling that wounds heal better when the operation has been performed under a general anesthetic. I know that this is a controversial subject and that it has not been definitely proved true. However, many surgeons operating with both local and general anesthetic agents believe it to be a clinical fact. I do not think that one should have a strong preference regarding any type of anesthetic agent. If one undertakes to practice surgery, he should be so well trained and so skilled that he can operate with all types of anesthetic agents equally well. Only then is he in a position to select the best type of anesthetic for the particular case.

We have a great many types of anesthetic agents from which to make a selection. We have not only the local anesthetics, such as procaine, but also the intravenous types, such as the barbiturates and evipan, the inhalants, such as nitrous oxide-oxygen and ether, and the basal types, of which avertin is an example. These basal anesthetics, I believe, offer the greatest opportunities for use in dental practice if we employ them properly. With the use of these newer types of anesthetics, such as avertin and evipan, the patient, even though he does recover within two or three hours, should not be allowed to leave the office and go home, but should be kept in the hospital for twenty-four hours. Avertin anesthesia is used in restorative dentistry as well as in surgery. It is especially indicated for the difficult child patient who needs several teeth restored at the operation. In some cases, it means bringing equipment to the hospital, where we can do our work properly.

We have seen many complications following the injudicious use of a local anesthetic, particularly around the lower third molar. People who come in for the removal of the mandibular third molar do not usually do so because the third molar is periapically infected. In the great majority of cases, the third

molar is partially erupted and there is inflammation of the soft tissues around the tooth, usually extending into the muscular tissue. We know that it is unwise to inject through infected and inflamed tissue because this often leads to complications. Such considerations limit the use of a local anesthetic in this region; nor is it always satisfactory to take out such a tooth under a general anesthetic. It is necessary to use surgical judgment and discretion. We may be able to operate early and abort the condition. On the other hand, it may be better to wait until the defense forces of the body have completely formed and the infection has been walled off. When we incise into inflamed tissue, we open the blood vessels, which are already distended, to the danger of direct invasion by the micro-organisms. Only after broad clinical experience and study is good surgical judgment acquired. Hospital internships and association with surgeons of wide clinical experience offer the recent graduate this opportunity.

IMPACTED UPPER CUSPIDS AND THE ANTRUM

Impaction of cuspids in the maxillae means potential trouble: they are too often removed without due precaution. This type of case should have thorough preoperative diagnosis. Most maxillary impacted cuspids are on the palatal surface, especially when the crown of the tooth is below the apices of the central incisors, lateral incisors and bicuspids. When the crown of the impacted cuspid is above the apices of these teeth, its removal will usually be most readily accomplished by approaching it from the labial aspect, and there will be less bone destruction. A good point in the diagnosis is this: When the impacted tooth is on the palatal surface, one can usually feel the apices of the central and the lateral incisors protruding through the labial tissue; and the crowns of these teeth are inclined toward the tongue. Sometimes, one may even feel the crown of the impacted cuspid protruding on the palatal surface. We must not forget that it is possible for these teeth to be fused, and even to extend through the bifurcation of the bicuspids and molars. Another frequent complication is a communication with the floor of the nose, or with the antrum of Highmore. The apices of impacted cuspids are often curved like a fishhook, and then there is often considerable bone destruction if the operator is not careful. All of this should be told the patient in advance, so that the operator may not be embarrassed later by difficult situations.

When a cuspid is removed from the palatal surface, I prefer to lay the soft tissue back from the necks of the teeth, ignoring the incisor foramen. Actually, there is not much bleeding from this source. No attempt at removing the bone should be made until the area has been completely exposed. It is well to remove the overlying bone in small pieces, using a mallet and chisel. When the crown has been completely exposed, the impacted tooth, if solid, can be split at the cervical border by two transverse cuts. The middle section of the tooth is then removed, after which there is no difficulty in removing the crown and the root, regardless of their condition. Sufficient room has been made, with a minimum of bone destruction. The palatal flap is then brought back into normal position and the tissue is sutured between the teeth at the interdental spaces. The postoperative care consists of merely removing the congested blood, daily. It is very seldom that a dressing is necessary in this region.

When an impacted cuspid is delivered from the labial aspect, a large flap is made, exposing the nasal spine, and the approach should be from above downward. Sufficient bone is removed to expose the crown of the cuspid. Care should be taken to avoid the apices of the central and lateral incisors.

An interesting and important factor in preoperative diagnosis is the determination of the size and extent of the maxillary antrum. This cavity usually extends as far forward as the first bicuspid. However, in many cases, the antrum is as far forward as the apex of the lateral incisor. In such a condition, the apex of the cuspid will invariably extend into the antrum. While it is true that the apices of most of the posterior teeth are in close contact with the maxillary antrum, it is also true that, in a large percentage of cases, there is no direct communication with the antrum when the teeth are removed. Because of this condition, however, one should not overlook the fact that, in about 25 per cent of cases, removal of the molars and bicuspids leaves an opening into the maxillary antrum.

The proper handling of this situation is open to considerable debate. However, when I discover an opening into the antrum, I leave the sinus as nearly undisturbed as possible The opening should be examined to determine whether the antrum is infected. If it is, the patient should be promptly informed and be referred to a competent rhinologist. If the antrum is not infected, the opening should be allowed to close normally. Often, a small piece of gauze placed in the marginal orifice of the socket will allow a satisfactory blood clot to form above, covering the opening, and, at the same time, the dressing will tend to keep food débris from irritating the socket. This dressing can usually be removed within twenty-four hours.

When the opening into the maxillary sinus is large, it is usually advisable to suture the mouth wound so as to prevent infection and food débris from gaining entrance to the maxillary sinus. A few well placed sutures will often prevent a chronic sinusitis. When the antrum opening is extremely large, and especially when the antrum is chronically infected and full of granulation tissue and pus, the competent oral surgeon can remove this diseased tissue from the antrum, suture the mouth wound tightly and then refer the patient to a rhinologist for an inferior turbinate puncture and further postoperative treatment. This procedure is necessary in order that proper drainage from the sinus be maintained, and so that the nose and throat specialist can irrigate the sinus gently to remove the blood clots which invariably form. If the sinus contains infected material or fluids, the danger of a chronic infection is imminent. Surely, it is better to refer the patient to the rhinologist before complications arise than to call him into the case after the dentist and the patient have had trouble.

IMMEDIATE DENTURES

Many patients desiring immediate dentures should not have them; but many who are afraid of them or who are ignorant of their possibilities should be persuaded to have immediate dentures. Certainly, the vogue for immediate dentures has grown in the past few years. Many dentists, however, because of their success in certain cases, attempt to place immediate dentures when they are undesirable. The type and kind of bone, the shape and size of the ridge, the number of teeth involved, the extent of pathologic change and the temperament and type of patient are some of the factors which must be carefully considered. Dentists who do not do their own surgical work have a tendency to undertrim the model when making immediate dentures, and thereby complicate the problem. Further, it is my observation that all immediate dentures need to be rebased, and therefore the patient should be so informed in advance, and the dentures should be made of a material which will permit inexpensive rebasing. Incidentally, some dentists have the impression that these dentures cannot be inserted while the patient is under a general anesthetic.

This is not my experience. I prefer to place immediate dentures, both full and partial, in position in the mouth while the patient is asleep. Thus, it is possible to set the denture several times if necessary, and to force it into place without hurting the patient. When the patient recovers consciousness, he does not complain so frequently about becoming accustomed to a denture which is already in position.

To be successful in immediate denture work, it is necessary that the dentist know how to prepare the plaster model. The man who has done considerable surgical work is better fitted to do this than the laboratory man. One must have surgical experience in order to know how the bone must be trimmed for successful immediate denture work. This means that the dental roentgenogram and the plaster cast must be studied thoroughly in advance of the operation and before the dentures are made. To my mind, a good dentist is the only one qualified to do this work; yet I note a tendency for many to have models trimmed by their laboratory man rather than to take time themselves to do it. This procedure should be condemned; and if the dentist prefers not to trim his own models, he should send the models to the oral surgeon and let him do it. In fact, I like to trim the plaster casts of the cases that I intend to operate upon.

THIRD MOLARS

When mandibular third molars are removed, the surgeon should always look to the condition of the maxillary third molars. Very often, these teeth complicate the removal of mandibular third molars. Often, they are extruded and buccally displaced so that the sharp cusps traumatize the mandibular as well as the buccal soft tissues and interfere with the proper healing of the mandibular wounds. The presence of a maxillary third molar may cause extensive trismus with excessive swelling, and consequent pain and delay in healing. Therefore, their early removal will help to speed up the healing of the mandibular socket, as well as provide an adequate and free cleansing area in the posterior part of the mouth. When the mandibular third molar is gone, the early removal of the maxillary third molar is not serious because, in the vast majority of cases, this tooth will eventually extrude, become carious, form a periodontal pocket and cause traumatism of the mandibular soft tissue. Very often, it is well to remove the extruded maxillary third molar as part of the pretreatment in dealing with an acute partially erupted mandibular third molar.

In removing impacted mandibular third molars, the possibility of paresthesia as a postoperative complication should not be overlooked. This very annoying sequel of mandibular third molar surgery is more frequent than most of us care to admit. When possible, the patient should be warned about it in advance of the operation, but care should be taken not to alarm him. This requires tact and diplomacy, but it is better than trying to make embarrassing and unsatisfactory explanations several days after the operation. It would be well for us to study the causes of paresthesia and to endeavor to develop technics to avoid the condition. I am frank to admit that I have no suggestion in this direction, but I believe that study and discussion of this very annoying condition is necessary.

NUMBER OF TEETH TO BE EXTRACTED

The determination of the number of teeth to be removed at one time has many factors. It is an individual problem and cannot be standardized. I was trained on the principle of removing a few teeth at a time when dealing with sick patients. For a number of years, I followed this plan with all sick patients, forgetting that the cases should be selected. In many cases, it is better to remove all the infected teeth at one

operation rather than submit the patient to the very serious psychologic effects of removing a few teeth at a time. Patients often dread to come back for the fourth or fifth operation; and, in many instances, they never come back. Sick patients should be built up to the point where they can safely undergo the work necessary. The anesthetic should be selected with the thought of avoiding strain and surgical shock. In my opinion, multiple surgical procedures are best carried out under a general anesthetic. The removal of thirty-two teeth, if done without undue trauma, is no more serious than the removal of an appendix. If the patient can stand the one operation, he certainly can stand the other. This does not mean that every case should be managed in the foregoing manner, but it does mean that we must stop referring patients to the specialist, saying, "Just take out one or two teeth." Let the man who is to do the surgical work decide. If he cannot decide, he has no right to be practicing surgery.

I urge you to emphasize to patients after the removal of their teeth the fact that they should make a determined effort to keep their mouths clean. The teeth should be brushed daily. A great many patients have a tendency to stop brushing the teeth because they do not want to hurt themselves. They feel that they may cause some injury to the mouth. Débris collects in the mouth, and, within two or three days, a Vincent's infection may develop, complicating the healing of the wound.

TRAUMATIZED AND DISLODGED TEETH

One of the engaging problems of exodontia practice is the proper treatment of the traumatized or dislodged anterior tooth. Since most of these accidents occur in young people, the value of the tooth to the patient is increased and the problem of restoration is indeed a difficult one. I believe that all such teeth should be saved whenever possible. If a tooth has been dislodged, it should be placed back in the socket and held in position by a splint. If it does not become reattached, it can be removed later, and if it should abscess, the pus can be drained and the root canal be treated, and, later, an apicoectomy can be performed. The traumatized tooth which has not been dislodged should be made immovable either by being ground out of occlusion or by being placed in a splint. The operator should then await developments. Sometimes, the case will subside without any complicating sequelae. When the patient has reached maturity, and if the physical condition indicates such a procedure, the nonvital tooth can be removed and a satisfactory restoration be made. The only cases in which radical procedures are indicated are those in which the labial or palatal plates have been badly fractured. In such cases, all loose bone should be removed as well as the teeth, and the soft tissues should be sutured into normal position in order to achieve the best plastic result. These cases call for judgment and experience, and unless a man is accustomed to handling many of these cases, he should seek consultation from competent sources.

In an interesting case which I recently observed, a periodontal abscess was caused by the presence of an ill-fitting lingual bar. Lingual bars should be placed in such a position that they will not irritate the soft tissue. This means that the bars should be arranged so as to avoid pressure in the marginal areas. The patient should be told that when dentures are dropped, they should be returned for proper fitting, as otherwise good teeth may be sacrificed through periodontal involvements.

An important point in the postoperative treatment of mouth wounds, particularly those resulting from the removal of impacted third molars, is that the socket should be gently irrigated daily to remove food débris and particularly

particles of dried disintegrating blood clots. Dried blood clots can act as residual areas of infection and cause considerable irritation to the wound.

Sharp process, particularly in the posterior part of the mouth on the lingual surface, is often seen about two weeks after extraction. It is very annoying to the patient, causing considerable pain for at least three days. Sharp process can easily be removed surgically, but because of the thinness of the soft tissue in this region, it is often advisable to postpone surgical measures and to wait until the bony process has sloughed sufficiently to allow its removal without the use of an anesthetic. Whenever possible, I have the patient wait, but if he is of a type that wants something done, a rather large flap is made, the bony process is chiseled off and the flap is brought back into position and held in place with a suture. You will note that I said a rather large flap. We have found that a large flap is easier to retract and, furthermore, it heals more readily when sutured into position.

In considering the difficulties to be encountered during operation, and especially in considering estimates given in advance of operation, one should carefully examine mouths to determine their size. Small mouths make working in the posterior part of the mouth difficult and often make a simple extraction a very complicated one calling for the greatest of patience and ingenuity. The same may be said of muscular fibers and muscular attachments which make retracting of the corner of the mouth annoying and painful not only to the patient, but also to the operator, because they require the expenditure of considerable energy and traction.

A great many men have the feeling that loose teeth are easy to remove. This is contrary to my experience. The loose tooth that has a small attachment at its apex in the bone is always a difficult tooth to remove. Unless the forceps are firmly placed upon the tooth and the tooth is grasped in its entirety, there is a great tendency to fracture the root at its apex and thereby make a simple operation difficult. Besides, these loose teeth often have considerable granulation around them. We have seen several carcinomas develop around the sites of loose teeth. Cases in which loose teeth have been removed and there is failure to heal properly should be watched for development of carcinoma. In many cases, early biopsy and treatment will insure cure. We have achieved some remarkable cures by referring these cases early. If a biopsy report is negative and the wound does not heal as it should, another section should be taken and should be sent to more than one laboratory.

Men in general practice should be wary of teeth that seem easy to remove; and I cannot too strongly urge that chronic inflammatory tissue around such teeth be sent to the laboratory for section and study. Many patients can be saved painful experiences and in some instances will be saved from early death by such a procedure.

Another fact about the loose tooth that has considerable chronic inflammatory tissue about it is that the gum tissues have a tendency to bleed profusely after extraction unless a determined effort is made to remove all granulation tissue. Even when this is done and a satisfactory plastic operation has been performed on the soft tissue, it is advisable to use one or two sutures to approximate the tissue and prevent postoperative bleeding. Bleeding in such cases is very difficult to control if all the granulation tissue has not been removed at the time of operation.

Hemorrhage following the extraction of teeth is an annoying and serious complication and one which can often be avoided if proper preoperative diagnosis is made. If a patient gives a history of bleeding, one should certainly determine

the blood clotting time before operating. It might be well to prescribe 60 grains of calcium lactate to be taken daily about two weeks previous to the operation.

Bleeding gums should always cause the operator to "stop, look and listen." The cause of the bleeding should be determined in advance of the operation. It may be a systemic condition such as hemorrhagica purpura, or it may be only a slight marginal gingivitis due to severe subgingival calculus. In any case, hasty extraction should not be the rule.

Much postoperative hemorrhage can be controlled by proper curettement of all granulation tissue at the time the surgical work is done; the smoothing down of the sharp and rough edges of bone so as to allow the soft tissue to hug the bone closely, and the judicious use of sutures in such a way as to allow the soft tissue to assume its proper position. Sharp and ragged edges of loose tissue which dangle over the edge of the alveolar bone are irritated by the movement of the tongue and cause continuous seepage of blood from the tissues.

If the socket shows a tendency to bleed continuously after the extraction, placing a small dressing in it will often control the bleeding. This dressing does not necessarily have to be packed tightly, but by keeping in the socket a simple postoperative dressing, one saturated with guaiacol and glycerine, the pain, as well as the bleeding, is very often completely controlled.

Crowded teeth, especially in the anterior part of the mouth, often present serious complications, leading to embarrassment unless the operator tells the patient in advance that the teeth in the vicinity of the extraction are apt to be chipped, scraped or slightly injured. Fillings in adjacent teeth will often fall out after an extraction. It is advisable to mention these facts to the patient in advance of the operation and not be embarrassed later by having to explain. Regardless of how careful the operator is, these accidents will occur. Some of them cannot be avoided. I dislike to extract teeth in the vicinity of porcelain jacket crowns, for oftentimes the porcelain jacket crowns are fractured or knocked loose regardless of how much care is exercised in the removal of adjacent infected teeth.

In conclusion, if we are surgeons of the mouth, let us aspire to be thorough, not passing trouble and responsibilities on to some one else. Our specialty has now a high place in professional medicine, and its future is limited only by ourselves and what we pass on to our successors.

1149 Sixteenth Street, N.W.

A PLEA FOR THE STANDARDIZATION OF ORAL SURGERY

By James R. Cameron, D.D.S., F.A.C.D., Philadelphia, Pa.

IN presenting a plea for the standardization of oral surgery, it is desired to create a discussion within this society that may lead eventually, through the leadership of this organization, to a more definite understanding of what the practice of oral surgery embraces and what it actually demands of the practitioner as a specialist.

In a broad sense, oral surgery deals with the management of disease, malformation and injuries of the mouth, jaws and associated parts. This branch of surgery has been developed by dentists as a surgical specialty of dentistry. The student should approach the subject from the standpoint of broad surgical principles and with an understanding of general and regional pathology. Students in medicine received in the past and today but meager instruction in the management of mouth and jaw lesions; whereas the student in a class A dental school receives a comprehensive course in oral surgery. It seems to your essayist that this is as it should be. Upon graduation, the dental student should be expected to have acquired a fundamental knowledge of jaw surgery which will permit him to recognize, and give advice in the care of, oral lesions. It is as unreasonable to expect the recent dental graduate to be proficient in the practice of oral surgery without additional training as it would be to expect the recent medical graduate to be experienced and skilled in surgery of the brain, gynecology or general surgery even after serving the usual hospital internship.

The practice of surgery, whether regional or general, requires of the student careful training and long hours under the tutelage of an experienced surgeon. Such training in surgical specialties is available to the medical graduate, but unfortunately opportunity to obtain experience in oral surgery is available to the dental graduate to only a very limited extent. This is, I believe, due in part to lack of interest, shown by many hospitals in failing to establish an oral surgery service, and, on the other hand, to the fact that in dentistry we have an insufficient number of men capable of meeting the demands of such a service. The result is that this specialty certainly is not on a par with other surgical services and is being handled in many hospitals in an indifferent and often haphazard manner.

Dentistry as a profession has had to defend itself consistently against an arrogant tendency on the part of medicine to belittle the efforts and the practice of dentistry. Until recent years little encouragement was offered dental graduates to pursue studies in a general hospital. The teaching in some of our dental schools gives the graduate scant encouragement to enter the field of oral surgery as a specialty unless he first obtains a degree in medicine. The much abused but descriptive modern expression "inferiority complex" may well be applied to dentists of the past, and to some extent to those of the present, in regard to the practice of oral surgery. However, dentistry has passed the "swaddling clothes" stage and is now well able to

Read before the American Society of Oral Surgeons and Exodontists, St. Louis, Mo., October 21, 1938.

conduct its practice in a manner approaching the ideal.

The general surgeon, the orthopedic surgeon, the otolaryngologist, the dentist and at times the specialist in exodontia all take a fling at oral surgery. The general surgeon and the orthopedic surgeon are often obliged to assume the care of jaw cases, not always because they desire to do so, but rather because the hospital has no properly trained oral surgeon on its staff. Many hospitals have a dental staff consisting of general dentists who are skilled but who are deficient in specialized surgical training, and consequently the work of such a service seldom includes the care of major jaw conditions. An illustration of this unqualified type of oral surgeon holding a staff position in many hospitals is observed by the frequency of such a dental staff member requesting one of the general surgeons to do an external incision and drainage of a deep submaxillary abscess or by referring a case of temporomandibular ankylosis to the Orthopedic Service, or a child with a cleft palate and cleft lip to the general surgeon. All such cases are within the domain of oral surgery, and if oral surgery as a specialty, or dentistry as a profession, is to receive the recognition it so much desires, these cases should be cared for, and responsibility be assumed by, a qualified oral surgeon.

Too many hospitals have a dental staff existing almost entirely on paper and functioning only as an emergency service to relieve an aching tooth or extract a tooth loosened by the ravages of pyorrhea. I know of dentists in the city of Philadelphia who boast that they are on the staffs of six or eight hospitals, yet in not one of these hospitals are these men recognized by the doorman, their visits to the hospital being so infrequent. Such men often style themselves oral surgeons and, in so doing, they retard oral surgery as a specialty.

Because of the indefinite understanding of this specialized field, it is difficult to know what type of work is actually done by a man whose title is that of oral surgeon. The title of rhinologist or ophthalmologist or urologist designates the type of work in which the specialist is engaged, but too often the title oral surgeon does not convey an accurate picture of oral surgery in its fullest application. Many of these men may be, and often are, highly skilled in the practice of exodontia, which is a specialty unto itself, but they lack the additional training so necessary to qualify them in the practice of all branches of oral surgery. Consequently, the care of seriously sick patients, or an operation involving considerable risk to the life of the patient, is usually such that this type of oral surgeon is neither willing nor capable of assuming the responsibility involved.

It is seldom that a highly skilled exodontist is competent in the management of major oral surgical problems. However, the combination of oral surgery and exodontia by one qualified in both specialties is sometimes a very successful arrangement, but I wonder if, in the course of the next few years, we shall not see a division of these specialties, just as we are observing today the tendency toward a separation of gynecology and obstetrics into two distinct specialties.

Oral surgery has been, and is being, developed slowly but surely by ambitious dental graduates, a few of whom have acquired the degree of doctor of medicine. The medical degree, in addition to that of D.D.S., gives the possessor many advantages that the man with one degree alone does not enjoy. But a degree in medicine does not of itself qualify one to practice oral surgery or any other surgical specialty. However, it does provide a good foundation upon which to build. Not infrequently, we see the holder of both the medical and dental degree drift away from oral surgery into other fields. Plastic surgery appears to be especially inviting to this group. Here again, oral surgery and its progress are

retarded by the loss of men whose primary interest was in this field, but who, after graduation in medicine, found other fields in surgery more inviting and of greater interest.

I believe that the old saying "where there is a will there is a way" can be applied in this discussion and the dental graduate interested in oral surgery can become experienced and skilled through additional training to qualify himself in the practice of this branch of surgery, even though he has not graduated in medicine. Suggestions for training in this specialty are an internship of at least twelve months in a general hospital under the guidance of an experienced oral surgeon, postgraduate instruction and additional study as a special student in a medical school and later association with an oral surgeon in active hospital practice.

Surgical specialties are aiming to elevate their standard of practice by the establishment of boards of certification. Possibly, a similar plan instituted and put into effect for the certification of specialists in oral surgery would aid considerably in the standardization of this specialty.

The field of surgery is large and the qualifications to practice surgery are constantly changing. With the division of surgery into specialties, a more thorough training of the specialist is being demanded. It almost seems as though the day of the general surgeon is rapidly passing in favor of a highly trained specialist in regional surgery. With few exceptions, the medical graduate not possessing a dental degree is not primarily interested in surgery of the jaws as a specialty. A few outstanding surgeons—Blair, of St. Louis, Dorrance, of Philadelphia, and Padgett, of Kansas City—are examples of general surgeons who are interested in surgery of the jaws and have contributed considerable to the development of this field. But these men are exceptions. The rank and file of general surgeons are not primarily interested in oral surgery, even though they frequently care for jaw cases.

Therefore, it seems this division of surgery must continue to be developed by dental graduates. Every grade A hospital should have a functioning oral service and at least one member of this service should be trained and experienced in the care of surgical lesions of the mouth and jaws. The specialist appointed to the position of chief of oral surgery or attending oral surgeon to a hospital should be willing to devote his time consistently to the building of a service to which the hospital and his colleagues can point with pride. It will be a service caring for all that can properly be considered oral surgical cases—and at no time will such a service belittle dentistry. Oral surgery will assume its rightful place in the hospital family and be considered on an equal plane with the other surgical specialties, instead of being merely considered a minor division of general surgery, as is so often the case at present.

The day is rapidly passing when general surgeons in our hospitals have the privilege of dictating what patients may go to the oral surgeon. Urology has faced a similar problem to that of oral surgery in breaking away from the influence of general surgery in order to standardize its practice. Oral surgery will be retarded as long as it remains under the wing of general surgery. With such a program carried forward by an enthusiastic student who is willing to spend long hours of study and hard work, any hospital worthy of caring for the sick and injured should offer rapid recognition.

Oral surgery, to be developed in its broadest sense, requires more and better trained men than we have been able to supply in the past. Through such an organization as this, it is the opportunity of dentistry to see that this specialty is developed and given the recognition it justly deserves.

269 South Nineteenth Street.

THE JOURNAL *of the*
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L. PIERCE ANTHONY, D.D.S., Editor

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DENTAL SERVICE AND SOCIAL SECURITY

EVEN before its formal accession to power, the present Governmental Administration was committed to a policy of social security embodying in its extensions the security of the health of the nation.

The first step toward the adoption of measures to formulate the policy as related to public health was the appointment by President Roosevelt, in 1935, of a committee to coordinate governmental health and welfare activities under the chairmanship of Miss Josephine Roche. As a result of that study of the health problem of the nation and at the suggestion of the President, a national health conference was called by the chairman, Miss Roche, for July 18, 1938, for the purpose of (1) presenting and discussing the needs of the people of this country for preventive and curative service in illness and for the reduction of the economic burdens caused by illness, and (2) discussing steps which may be taken to meet these needs as proposed by representatives of the Government and by members of the conference.

This conference developed two significant views of the national health problem: first, that the administrative representatives were determined

to inaugurate and pursue to a definite conclusion a plan to furnish health service to all classes of the public, and, second, that there was an agressive opposition on the part of the American Medical Association to the methods and procedures proposed.

The political interests involved, however, proceeded to the next step in the prosecution of the health security objective and, without regard to any objections offered by the medical association, introduced into the United States Senate, in February 1939, under the sponsorship of Senator Robert F. Wagner, of New York, what has since become known as the Wagner Health Bill, S. 1620.

This bill, because of its failure to recognize or consider the principles upon which health service in the past has been rendered by the medical profession, and because it apparently ignored or was in conflict with the interests of the medical profession, in that it transgressed the principles, traditions and sentiments upon which the practice of medicine has been developed, aroused a violent storm of protest, not only from the medical profession, but also from the laity.

The American Medical Association next went on record at its St. Louis 1939 meeting with twenty-two formal objections to the Wagner Bill.

The American Dental Association, since the National Health Conference here noted, has given serious consideration to the dental interests involved and, at the meeting in St. Louis in October 1938, the House of Delegates promulgated eight broad principles which should be observed in devising any program of health service to the public:

> I. In all conferences that may lead to the formation of a plan relative to a national health program, there must be participation by authorized representatives of the American Dental Association.
>
> II. The (national health) plan should give careful consideration to: first, the needs of the people; second, the obligation to the taxpayers; third, the service to be rendered, and fourth, the interests of the profession.
>
> III. The plan should be flexible, so as to be adaptable to local conditions.
>
> IV. There must be complete exclusion of nonprofessional profit-seeking agencies.
>
> V. The dental phase of a national health program should be approached on a basis of prevention of dental disease.
>
> VI. The plan should provide for an extensive program of dental health education for the control of dental disease.
>
> VII. The plan should include provisions for rendering the highest quality of dental service to those of the population whose economic

status, in the opinion of their local authorities, will not permit them to provide such service for themselves, to the extent of prenatal care, the detection and correction of dental defects in children and such other service as is necessary to health and the rehabilitation of both children and adults.

VIII. For the protection of the public, the plan shall provide that the dental profession assume responsibility for determining the quality and method of any service to be rendered.

At the St. Louis meeting, 1938, the Board of Trustees of the American Dental Association further appointed the National Health Program Committee, composed of C. Willard Camalier, Leroy M. S. Miner, Alfred Walker, Raymond C. Walls and Harold W. Oppice, chairman, with instructions to take whatever steps were deemed necessary to safeguard the interests of dentistry in its vital relationships to public health service. Accordingly, this committee asked for and was granted a hearing before the Senate committee, to which the Wagner Bill was referred. In another department of the present issue, there is presented the statement of the committee in which it has set forth the principles upon which, from the dental relationship, any health program undertaking to deliver health service to the public, under whatever supervision or circumstance, should be established.

While the opposition to governmental supervision of health service has not been so pronounced in the dental profession at large, the inherent principles involved are applicable in the same degree as those apparent in medical practice. This attitude may be due to the fact that dentistry has suffered more than any other specialty of the health service from the economic stress imposed by the depression, with the result that the dental needs of the public have gone far beyond the physical capacity of the profession. The discrepancy between demand and need, however, has enabled the profession to apparently meet its professional obligations to the public.

If, however, the government assumes the responsibility of health service to the public, dentistry must look to its laurels and devise ways and methods that will meet needs which we anticipate will be transformed into demands. And this is the purpose we have in mind as one of the services which the National Health Program Committee may perform—to devise a plan for rendering dental service that will, in a measurable degree, fulfil our obligations to the public. And that, we take it, is what will be expected of us, if and when the government institutes what we conceive to be socialized dental service.

In the nature of the case, the strictures against political control of health service set forth by the medical profession are equally applicable to dental service. Even the personal relationship of patient and physician, so properly emphasized by the American Medical Association, is of equal gravity in dental health service. It has been impressively shown that the personal contact which affords individual care and observation enables the dentist to render a service more valuable than where the service is impersonal, as it were. There are innumerable instances in which the dentist has been enabled through clinical knowledge and experience to carry a masticatory apparatus through its life cycle in perfect health and efficiency.

The attitude of the dental profession, as previously noted, toward the efforts of the government to insure health security, has been much more conciliatory than that of other health bodies, and this attitude is further emphasized by the offer of the National Health Program Committee of the American Dental Association to consultatively cooperate with the governmental authorities in the formulation of its plans for health security in so far as they concern the dental health of the nation. This principle, as well as the seven others proposed by the American Dental Association in 1938, has been ignored by those charged with the formulation of the national health program as set forth in the Wagner Bill.

It is difficult to believe that the formulating body has intentionally ignored the official body of American dentistry, and we trust that the efforts of the Health Program Committee toward cooperation will be more successful than similar efforts have been in the past, to the end that dental authorities will be accorded their proper recognition in the health councils of the future.

We would particularly emphasize the importance of the fifth principle established by the House of Delegates of the American Dental Association in October 1938; namely, that "the dental phase of a national health program should be approached on a basis of prevention of dental disease."

The presence of dental disease is so distressingly universal that it is economically unsound, not to say physically impossible, to attempt to supply restorative dental service for the entire population. Our only hope is the inauguration and vigorous prosecution of a program of prevention, and the profession has already made definite progress in the inauguration of plans of procedure that give promise of caring for the

national need if they are intelligently and assiduously applied from the earliest ages.

This last mentioned principle will be automatically provided for if the governmental authorities will forward, in collaboration with the profession, an extensive program of dental health education for the control of dental disease, supplemented by a research program for the study of the etiology of dental caries. It has long been recognized in dental circles that the profession is unable to solve this vital problem through its single efforts because of the numerous biologic factors involved that require efforts outside the scope of dental research. Until such efforts are inaugurated and are fruitful, the National Health Program Committee offers a practical program of education and prevention that promises to meet the immediate necessities of dental health.

The American Medical Association has expressed twenty-two well-thought-out objections to the Wagner Bill; the American Dental Association has formulated ten equally well-reasoned objections to the bill as set forth in the statement of the committee here under discussion, and we are hopeful that these well-considered objections, based on the experience of these two professions, will receive the consideration that the opinions of two such highly authoritative health bodies should receive.

While there is little expectation that the Wagner Bill, S. 1620, will be adopted at the present session of Congress, or in its present form, it contains the basic principles upon which a health bill will be formulated. Hence, the general apprehensiveness of those concerned in the medical and dental professions lest a bill be adopted that will place the administration of health service under the control of extraneous political interests to the detriment of the ideals upon which health service of the past has been predicated.

OBITUARY

HARRY A. HOLDER, D.D.S.

(1880-1939)

HARRY A. HOLDER died February 9, 1939, at his residence in Nashville, Tenn. He was a native of Sumner County, Tennessee, where he was educated in local schools. He received his professional education in the Dental Department of Vanderbilt University, where he was graduated in 1901.

In 1921, Dr. Holder began to specialize in orthodontia. He moved to Nashville, where he continued to practice this specialty with marked success up to the time of his death.

While practicing in Gallatin, Dr. Holder was called to the faculty of the College of Dentistry, University of Tennessee, then located in Nashville, where he was professor of dental anatomy and dental histology. Later, he became a member of the faculty of the School of Dentistry of Vanderbilt University.

Dr. Holder was a past president and former secretary of the Southern Society of Orthodontists, and past president of the American Association of Orthodontists, of the Fifth District Dental Society of Tennessee and of the Tennessee State Dental Association. In all these positions of honor and trust, he was loyal, modest and efficient.

In addition to his brilliant professional career, church, civic and fraternal organizations claimed Dr. Holder's interest. He was a deacon in the First Presbyterian Church of Nashville and a member of the Kiwanis Club and of the University Club.

The widow, Margaret Pierce Holder, four sons and one daughter, all of Nashville, survive.

DEATHS

Appleby, Ralph O., Mt. Angel, Ore.; North Pacific College of Oregon, School of Dentistry, 1913; died March 20; aged 49.

Brandon, Robert B., Portland, Ore.; North Pacific College of Oregon, School of Dentistry, 1909; died March 26; aged 54.

Collett, Jonathan P., Dayton, Ohio; University of Michigan, School of Dentistry, 1896; died January 29; aged 69.

Cormany, Harry M., Cincinnati, Ohio; Ohio College of Dental Surgery, 1906; died May 19; aged 56.

Davis, William E., Wilkes-Barre, Pa.; Medico-Chirurgical College of Philadelphia, Department of Dentistry, 1901; died May 7; aged 64.

De Puy, Hiram, Tacoma, Wash.; Harvard University Dental School, 1881; died recently.

Hawley, Joel, Kansas City, Mo.; Western Dental College, 1902; died May 5; aged 65.

Hewish, Harold C., Philadelphia, Pa.; Philadelphia Dental College, 1892; died April 4; aged 71.

Montieth, E. B., Chicago, Ill.; Northwestern University Dental School, 1905; died April 9.

Shepherd, Aaron J., Tremont, Ill.; Northwestern University Dental School, 1898; died April 11; aged 68.

Stowell, C. F. B., Morley, Mich.; University of Michigan, School of Dentistry, 1905; died April 23.

Thompson, Archibald C., Detroit, Mich.; University of Michigan, School of Dentistry, 1899; died March 23; aged 67.

COUNCIL ON DENTAL THERAPEUTICS

ANNUAL MEETING OF THE COUNCIL ON DENTAL THERAPEUTICS

IT is an established principle of the Council on Dental Therapeutics to advise the members of the dental profession and the public of its decisions as soon as circumstances permit. In accordance with this principle, the following items discussed during the last meeting of the Council, and which may be of interest to both dentists and manufacturers, are authorized for publication.

The Tenth Annual Meeting of the Council on Dental Therapeutics, which marked the first decade of service to the dental profession and the public, was held in Chicago at the Knickerbocker Hotel, February 10 and 11, 1939.

Members in attendance at the meeting were: J. Howard Brown, Paul J. Hanzlik, Thomas J. Hill, Milan A. Logan, Arno B. Luckhardt, Harry Lyons, John A. Marshall, Victor C. Myers, Harold S. Smith and Harold L. Hansen.

Donald A. Wallace, associate chemist in the Bureau of Chemistry, was present at all sessions of the meeting.

Guests present for a part of the meeting were: Marcus L. Ward, President of the American Dental Association; Arthur A. Merritt, President Elect of the American Dental Association; L. Pierce Anthony, Editor, THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION; Franklin C. Bing, secretary of the Council on Foods, American Medical Association; E. M. K. Geiling, professor of pharmacology, University of Chicago, and member of the Council on Pharmacy and Chemistry of the American Medical Association; Theodor Klumpp, chief, Drug Division, Food and Drug Administration, U. S. Department of Agriculture, Washington, D. C.; Paul N. Leech, secretary, Council on Pharmacy and Chemistry, American Medical Association, and K. E. Miller, senior surgeon, U. S. P. H. S., Federal Trade Commission, Washington, D. C.

Among the important tasks confronting the Council was the nomination of a successor to U. Garfield Rickert, deceased. After a careful survey of available candidates, the Council nominated Paul H. Jeserich, professor of operative dentistry, director of graduate and postgraduate education and director of operative clinics at the School of Dentistry, University of Michigan, Ann Arbor, to fill Dr. Rickert's unexpired term. Dr. Jeserich was duly appointed to membership on the Council by Marcus L. Ward. The profession will be gratified to learn that Dr. Jeserich has accepted the appointment.

In order that the profession may be apprised of the activities of the Council, a statistical summary of the Council's work is presented herewith.

STATISTICAL SUMMARY OF PRODUCTS CONSIDERED

(January 1930-January 1939, inclusive)

Products announced as accepted in THE JOURNAL	602
Products announced as not acceptable in THE JOURNAL (including Notices of Judgment)	300
Products not acceptable, but reports unpublished	129
Products reaccepted	177
Products omitted from A.D.R.	59
Acceptance and provisional acceptance recommended	60

Acceptance not recommended, still under consideration	5
Awaiting more evidence from proprietor for disposition	9
Products acceptable, announcement delayed	14
Awaiting report of referee	3
Consideration postponed	29
Official drugs in A.D.R.	225
Products examined in the Bureau of Chemistry (findings not published). (This list includes work on acceptable products checked by the Bureau for conformity with Council provisions; work which has induced manufacturers to institute suitable changes; work done at the request of individual members of the profession, and work on which separate reports have not been prepared)	87
Total	1699
Minus items 4 and 5 (reaccepted and omitted products)	236
	1463
Products discussed in answer to inquiries, etc., not including the above products, approximately	1025
Total products brought to the attention of the Council in one way or another	2488

The increase in personnel in the Bureau of Chemistry has resulted in an improved service to the profession and to the public. This is particularly important and gratifying at the present time in view of the steady increase in the Council's work and of the frequent requests for the Council's scientific opinions on matters of interest to the profession and to the public.

SULFANILAMIDE AND RELATED SUBSTANCES

A review on sulfanilamide appeared in this section of THE JOURNAL (25:1474, September 1938). Since the time of this report, an enormous amount of work on this substance has resulted in certain modifications in the status of sulfanilamide in medical practice. In order that the dental profession may be kept informed of changes in the study of this important medicinal, the Council arranged for publication of another review (J.A.D.A., 26:987, June 1939). The evidence for the usefulness of sulfanilamide and related substances in dentistry is still insufficient for an accurate appraisal. While sulfanilamide *in vivo* is not bactericidal, it is possible that further critical investigation will indicate its usefulness in certain oral lesions.

Among other investigations, critical studies of the effect of sulfanilamide on the blood clot should be made as an aid in the establishment of the usefulness or limitations of this product for treatment of tooth sockets. There is no doubt that the use of sulfanilamide and related substances in dental practice should be based upon more extensive, conclusive scientific evidence than is now available. Above all, it is important to remember that the oral or parenteral administration of sulfanilamide should be carried out only under the continuous supervision of a competent physician. While untoward and even dangerous side effects of this drug have not been frequent, particularly when moderate doses have been employed, they are apparently unpredictable.

LOCAL ANESTHETIC SOLUTIONS

On the basis of communications received from manufacturers relative to the dating of local anesthetic solutions and of an independent study by the Council and the Bureau of Chemistry of the problems involved in the marketing and use of local anesthetic solutions, it would appear that suitable precautions should be taken to assure the protection of the profession and the public against the use of solutions which have undergone deterioration in storage or for any other reason. In its review of the situation, the Council has considered constructive suggestions received from members of the profession and from manufacturers. In the light of these suggestions and on the basis of its own observations and studies, the Council suggests that an expiration date, the suit-

ability and accuracy of which are based upon adequate evidence and beyond which the use of these solutions is not recommended, be placed upon the package label of local anesthetic solutions. The Council further suggests that manufacturers may, if they deem it advisable or expedient, place upon the package label or on package inserts suitable comments regarding the proper storage of local anesthetic solutions. It is also suggested that, on package inserts or circulars, manufacturers place suitable warnings against the use of discolored local anesthetic solutions. If manufacturers so desire, they may also place the date of manufacture upon the package label of local anesthetic solutions. The Council requests that manufacturers arrange to put this constructive program into effect on or before June 1, 1940.

The Council has received many requests for information regarding the alleged advantages of epinephrine substitutes over epinephrine in local anesthetic solutions designed for dental use. Claims for marked superiority, including claims for greater safety of solutions containing the commonly used epinephrine substitutes, neosynephrine and cobefrin, over similar solutions containing epinephrine have not been substantiated by recent critical laboratory and clinical studies. Claims for local anesthetic solutions containing epinephrine substitutes which are based upon the pharmacologic properties of the vasoconstrictor agents alone are inadequate and may be misleading. There is no doubt that local anesthetic solutions containing the accepted epinephrine substitutes will produce satisfactory local anesthesia and that solutions containing these substitutes may have certain advantages over similar solutions containing the usual clinical concentrations of epinephrine; but the local anesthetic solutions containing epinephrine substitutes also have disadvantages as compared with local anesthetic solutions containing epinephrine.

GERMICIDES, ANTISEPTICS AND DISINFECTANTS

One of the important problems of everyday dental practice is the prevention of infection due to the accidental introduction of micro-organisms into dental tissue during the course of dental operations. In Accepted Dental Remedies 1938, the Council has indicated, among other things, that all solutions for the disinfection of dental instruments have marked limitations. In this connection, it should be remembered that there is a distinction between the word "sterilize" and the word "disinfect." The former term is often used in connection with the treatment of dental and surgical instruments by the so-called cold sterilization technic. Recent investigations of many of the widely used solutions designed for the disinfection of dental instruments indicate that these solutions are not effective against certain bacterial spores and hence are not sterilizing agents in the proper sense of the word. Manufacturers of accepted products have taken cognizance of this fact and have replaced the words "sterilize" and "sterilization" with "disinfect" and "disinfection." A review of the scientific findings relative to the germicidal and disinfectant properties of some substances used in dental practice will be presented later for publication in this section of THE JOURNAL.

The Council has had occasion, during the past year, to examine several products promoted to the profession for the purpose of sterilizing the handpiece. A critical examination of one of these indicated that while it might be of some usefulness in cleaning the handpiece, its bactericidal value was negligible. It is to the manufacturer's credit that he has informed the Council of the deletion of germicidal claims in the promotion of his product. Another product promoted to the profession was the subject of a Cease and Desist Order by the Food and Drug Administration (Notice of Judg-

ment 1622 under the Insecticide Act, issued November 1938).

A consultant of the Council has directed the attention of this body to the practice of immersing syringe needles in various solutions of chemicals for the purpose of sterilization. In addition to the limitations of such solutions noted above, the Council desires to point out that this procedure, without preliminary and thorough rinsing of the lumen of the needle with the disinfecting solution, probably does not insure proper contact of the disinfecting solution with the interior of the needle.

GENERAL ANESTHETICS

The number of articles on general anesthesia and general anesthetics appearing in the dental literature indicates an increasing interest in this subject. Without any intention of making adverse criticism of the contents of these articles, the Council is impelled to inform the profession that the indiscriminate use of general anesthetics in dental practice is fraught with danger. This statement is particularly pertinent in view of the fact that the successful use of general anesthetics depends on adequate and specialized training—a type of training which dental students do not generally receive. It is the Council's opinion that the administration of general anesthetics in the absence of a well-trained assistant is distinctly inadvisable. The Council recognizes the fact that general anesthetics fulfil a useful function, but believes that the limitations and dangers involved in their administration should be clearly recognized.

The ascending potencies of three commonly used anesthetics are: nitrous oxide, ethylene and cyclopropane. The last mentioned is apparently much more powerful than ethylene. All of these products are subject to the explosion hazard. The superiority of cyclopropane over ethylene has not been established, and while it is a more powerful anesthetic than is ethylene, it is also more toxic.

POTENTIALLY HARMFUL DRUGS

Recent federal legislation contains provisions relating to the sale of potentially harmful drugs or mixtures containing such drugs. In a previous report in this section of THE JOURNAL (25:1678, October 1938), the dental profession was informed that the drugs aminopyrine and sulfanilamide had been classed as potentially dangerous, and were therefo. subject to the provisions contained in section 502j of the recent Food, Drug and Cosmetic Act.

The Council has reviewed accumulated reports in the scientific literature on sodium perborate. In the face of both past and recent clinical findings, the Council sees no reason for revising its views concerning sodium perborate; namely, that this product is a potentially harmful drug which should be used only under the direction of a dentist or a physician.

DIET AND DENTAL HEALTH

The Council's position with respect to the use of vitamin preparations, including vitamin C, and mineral supplements, is fully discussed in Accepted Dental Remedies 1938. The Council sees no need for fundamental revision of its position on these products at the present time.

Administration of polypharmacal vitamin preparations is to be deplored. The Council is also cognizant of the fact that increase in potencies of vitamin preparations together with the indiscriminate use of such products may lead to untoward effects.

The profession is familiar with numerous reports in the dental literature on the relationship between the ingestion of fluorides and the occurrence of mottled enamel. The increasing use of fluorides in insecticide sprays presents a problem of major importance to the dental profession. The use of foods containing

fluorides is a matter which requires careful study. Not only must a long-range view of the problems involved in fluoride toxicosis take into account the points mentioned above, but also it must be realized that ingestion of fluorine-containing substances of various kinds and from various sources may have an additive effect. For this reason, the establishment of suitable tolerance limits for various types of food products is a matter of major concern.

CONTACTS WITH FOREIGN DENTISTS AND FOREIGN DENTAL SOCIETIES

That the influence of the Council's program has reached into other countries is shown by the fact that the Council's office frequently receives requests for information on matters pertaining to dental therapeutics from widely separated localities. Letters, Council reports and copies of Accepted Dental Remedies have been sent to China, India, Africa, Europe and South America, as well as other places.

The Council has been happy to present to the British Dental Society information concerning the rules, regulations and procedures involved in the development of a rational dental therapeutics. The Council extends congratulations to the British Dental Society and its elected committee on the decision to attempt the inauguration of a program of such importance to the dental profession everywhere.

THE COUNCIL'S CONTACT WITH THE PUBLIC

The Council continues to receive numerous requests for information on dental products promoted to the public. It is particularly encouraging to note that school teachers and students are turning in ever-increasing numbers to the Council for advice regarding articles of dental interest. Within the limits of its means, the Council has made, and will continue to make, every effort not only to supply requests for information, but also to impress on the public the scientific attainments and the aspirations of the dental profession. It is of interest to observe that many of these requests for information come from persons acting not as individual agents, but as representatives of groups. The establishment of consumer education classes in both public and private institutions of learning as well as among other lay groups represents an opportunity for effective education of the laity along dental lines.

RELATIONSHIP WITH OTHER AGENCIES

During the past year, the Council has had the pleasure of supplying scientific information to better business bureaus. Several pamphlets published by better business bureaus contain statements on dental products which are based upon Council reports. The Council has continued its policy of supplying scientific opinions to governmental agencies.

The profession of pharmacy is manifesting considerable interest in the work of the dental profession and in cooperative measures designed for the advancement of both professions in the interests of the public health. This has been shown by an increase in demands for Accepted Dental Remedies on the part of pharmacists and by the appearance of articles devoted to a discussion of dental problems in the journals of the profession of pharmacy. Cooperation between these professions is highly desirable and should be encouraged.

DENTIFRICES

During the past year, there has been a steady increase in the number of products submitted to the Council and found acceptable. It has been noted that the promotional methods employed by some manufacturers of nationally advertised dentifrices have undergone an improvement. While the general situation is still unsatisfactory, there are definite signs of improvement in this field. The Council is of the opinion that continued and last-

ing improvement must be aided and abetted by the active cooperation of the dental profession and by the education of the public. Fortunately, the public is in a receptive mood for sound educational material.

In view of the fact that many ethical dentifrice manufacturers and distributors have found compliance with the Council's regulations regarding the naming of their products inconvenient, the Council has undertaken revision of its rules of nomenclature as these pertain to dentifrices. While the Council still prefers that the name of a dentifrice developed subsequently to the formation of the Council be a proper name which refers either to the name of the firm or to some responsible individual associated with the firm, the Council will, under conditions which it may deem desirable or necessary, permit the use of names adopted according to the regulations contained in the following statement: The Council will consider for dentifrices trade names which imply no therapeutic or other objectionable claims, but which do not indicate the name of the company, and which are not the names of established lines of cosmetics or drugs of which the dentifrice may be an item.

ACCEPTED DENTAL REMEDIES

Accepted Dental Remedies, which was revised in 1938, continues to fill an important position in dental education. At the present time, practically all dental schools in this country use the volume for the training of dental students. In view of this fact, the Council feels it highly desirable to continue the publication of Accepted Dental Remedies on an annual basis.

ACKNOWLEDGMENTS

The Council makes grateful acknowledgment of its appreciation for the encouragement and assistance rendered by the profession at large and particularly to the following who have generously given of their time and energy during the past year: Drs. Gerald D. Timmons, E. G. Meisel, George E. Morgan, G. C. Schicks of Rutgers University, E. H. Hatton, Frank Kanthak, Paul Pickering, Isaac Schour, Louis I. Grossman, B. G. Bibby, A. H. Throndson, M. L. Tainter, Paul N. Leech, Franklin C. Bing, Daniel Lynch, Stanley Clark, E. M. K. Geiling, Edward Dobbs, Sumter Arnim and R. W. Bunting.

RENOMINATIONS AND REELECTIONS

Harold S. Smith was nominated to the Board of Trustees for reelection as chairman of the Council. Paul J. Hanzlik was reelected vice chairman of the Council.

HAROLD L. HANSEN, *Secretary.*

IODENT TOOTH PASTE NO. 1 AND IODENT TOOTH PASTE NO. 2 DELETED FROM ACCEPTED DENTAL REMEDIES

At the expiration of the last yearly period of acceptance, for Iodent Tooth Paste No. 1 and Iodent Tooth Paste No. 2, the Council voted to delete these products from Accepted Dental Remedies because of conflict with Council rules regarding promotion of dentifrices.

The Iodent Chemical Company has been informed of the Council's willingness to consider Iodent Tooth Paste No. 1 and Iodent Tooth Paste No. 2 for readmission to the list of accepted dentifrices on formal submission of the products in accordance with Council rules.

ASSOCIATION ACTIVITIES

AMERICAN DENTAL ASSOCIATION GROUP INSURANCE

By A. D. Weakley,* D.D.S., Washington, D. C.

WHENEVER any one questions me concerning the permanency and stability of the American Dental Association group insurance plan, I am reminded of a statement that was to me a paradox:

Nothing is more *uncertain* than life, yet nothing is more *certain* than LIFE INSURANCE.

An analysis of the foregoing statement will reveal some very interesting facts that are not commonly known to the layman. Verification of the truth of the statement concerning the business of life insurance is based on the following:

1. For more than 100 years, the mortality tables used by all legal reserve life insurance companies have been found so accurate that they can be unerringly depended on to adequately forecast average mortality.

2. Careful selection of risks by the companies will result in the actual mortality being less than the expected mortality, thereby providing a surplus for dividends, etc.

3. It has been demonstrated that the life insurance business is so sound that production of new business can be completely abandoned and the company will continue to show a profit.

4. By high quality selection in the investment of reserves (which are deposited with the insurance departments of various states to guarantee payment of claims) and also owing to careful regulation by the insurance departments, loss from investments is rare indeed.

It therefore follows that dishonesty or gross inefficiency (or both) are the only real threats to a company's prosperity, once it has established a sizeable premium income, if the business has been selected according to the known law of averages.

The American Dental Association group insurance is as large as many good small companies from the standpoint of both insurance in force and premium income.

Since the business itself is sound, the permanency and stability of the A. D. A. group insurance plan are therefore dependent upon only two contingencies: (1) the financial strength of the Great-West Life Assurance Company, which carries the risk and (2) the continued support of the plan by the A.D.A. membership.

We can eliminate the first contingency, since the Great-West Life Assurance Co. is the largest and strongest company eligible to carry the policy, and since all recognized authorities give the Great-West the highest rating awarded any insurance company. The Great-West Life Assurance Co. has more than $600,000,000 insurance in force and more than $160,000,000 in assets.

As to the elimination of the second contingency, i.e., the support of the plan by the A. D. A. membership, the following analysis will give a fairly comprehensive picture of where we stand, assuming

*Chairman, Insurance Committee, A.D.A.

of course that the American Dental Association itself is both permanent and stable:

1. The rates are adequate to meet mortality costs as long as those insured represent an average or better-than-average portion of the membership.

2. Selection of risks, which is the responsibility of the insurance company, will improve the average of those insured as time goes on and new members are added to replace the poorer risks who are eliminated by death.

3. The plan of insurance automatically eliminates any worry as to the average age of those insured since each age group is paying its own cost.

It therefore follows that our only concern is the addition of new members to those insured. The goal, which was worked out by the insurance committee and the insurance company jointly about a year ago, was to add 800 new policyholders a year. Since then, the annual quota has been practically tripled, the committee receiving more than 2,300 new applications within the past eight months.

I therefore have no hesitancy in assuring every member that if anything can be guaranteed, the continued success of our policy can be.

1029 Vermont Avenue.

"BASIC STANDARDS OF HOSPITAL DENTAL SERVICE AS A FUNDAMENTAL REQUIREMENT OF APPROVED CLASS 'A' HOSPITALS"*

II. MINIMUM STANDARDS FOR THE HOSPITAL DENTAL SERVICE

1. A department of dentistry should be an official requirement for Class "A" hospital rating.

2. The department should be organized and administered as a separate, autonomous department, equivalent to the various specialties of medicine and surgery, and represented in like manner on the medical board.

To this end, hospital bylaws and other governing regulations should be amended and revised as necessary.

3. The director of the department of dentistry, the chiefs of its several divisions, and other dentists holding the rank of visiting dentist should constitute a dental board to recommend to the medical board or other properly constituted authority standards and policies for the department of dentistry and appointments to the dental staff.

a. The director of the department should be a dentist in general practice, except where service is restricted to one division of dentistry, in which instances the director should be a specialist in that division.

b. The chief of each division should be a dentist who confines his private practice to that division or specialty, and has professional recognition in that field.

c. Requirements for appointments to the staff should include: (1) graduation from an accepted dental school in good standing, and license to practice in the state; (2) where a recognized specialty is to be practiced, special qualifications as defined in minimum standards, and general competence in the special field; (3) good moral character and adherence to sound professional ethics. (In the latter regard, it should be understood that the practice of fee-splitting under any guise whatsoever is not consistent with sound professional ethics.)

4. The department should be adequately equipped for complete dental diagnosis (x-ray and pulp-testing machines are basic requirements) and for such other services as are to be practiced.

5. A systematic plan of management (Section III, this report) should guide the dental board in administering the department.

WALDO H. MORK.

*In the June 1939 issue we published the Report of the Committee on Community Dental Service of the New York Tuberculosis and Health Association recommending dental standards and services in hospitals and institutions. With the consent of Dr. McCall, Chairman of the Committee, we are publishing herewith a minority report, by Dr. Waldo H. Mork, a member of the Committee.—Ed.

RESEARCH COMMISSION OF THE AMERICAN DENTAL ASSOCIATION

LISTS OF CERTIFIED DENTAL MATERIALS

(As of July 1, 1939)

THE A.D.A. Research Commission in cooperation with the National Bureau of Standards, has developed specifications for the following materials: amalgam, inlay investment, impression compound, inlay casting wax, inlay casting gold alloy, mercury, wrought gold wire, zinc phosphate cement and silicate cement.

Samples of the foregoing materials which were certified to the Research Commission by the various manufacturers as complying with the A.D.A. specifications were procured on the retail market by the Research Commission and were tested by the A.D.A. Research Associates at the National Bureau of Standards. The following certified materials were found to comply with the A.D.A. Specifications. Certified materials which did not comply with specifications are omitted from the lists.

Materials listed below are constantly being tested. Therefore, the lists are subject to revision from time to time. The revised lists will be published in the JOURNAL. These lists are your buyers' guide.

CERTIFIED AMALGAM ALLOYS (A.D.A. SPECIFICATION NO. 1.)

Alloy	Manufacturer or Distributor
Accurate Metalloy (filings)	The L. D. Caulk Co.
Ackerman (filings)	Ackerman Dental Mfg. Co.
Argentum ("A" cut)	Hammond Dental Mfg. Co.
Argentum (fine cut)	
Argentum (medium cut)	
Argentum (shavings)	
Aristaloy	Baker & Co., Inc.
Banner (filings)	Goldsmith Bros. S. & R. Co.
Blue Diamond (filings)	Reliance Dental Mfg. Co.
Brewster Medium (shavings); Quick (filings); Quick (shavings)	E. R. S. Brewster
Capeako (filings)	Precious Metals Refining Works
Certified	Lee S. Smith & Son Mfg. Co.
Coe	Coe Laboratories, Inc.
Cresilver	Crescent Dental Mfg. Co.
Dee (filings)	Thomas J. Dee & Co.
Diamond Edge	Young-Baker & Co.
Excel	Daniels Dental Alloy Co.
Fleck's	Mizzy, Inc.
Minimax (filings) 173, 177, 178, 183, (shavings) 177, 178	The Minimax Co.
Minimax White Gold & Platinum	
Mission No. 5	Henry F. Bruce Co.
Mission No. 5 ("A" cut)	
Mission No. 6	
Modeloy (Quick Setting) (filings)	Crescent Dental Mfg. Co.
Mynol Improved	Mynol Chemical Co.
Ney-Aloy	The J. M. Ney Co.
Ney's No. 125	

Odontographic "Improved" (filings)	Odontographic Mfg. Co.
Pearlol	Wildberg Bros. S. & R. Co.
Preferred C	Precious Metals Refining Works
Preferred D	Precious Metals Refining Works
Research Oralloy	Precious Metals Research Works, Inc.
Silver Crown	General Refineries, Inc.
Silver Crown (Medium)	General Refineries, Inc.
Silverloy (filings), Silverloy (shavings)	Crescent Dental Mfg. Co.
Speyer	Speyer Smelting & Refining Co.
S-C Medium (filings); S-C Quick (filings)	Stratford-Cookson Co.
True Dentalloy (filings)	The S. S. White Dental Mfg. Co.
True Dentalloy (cut "A")	The S. S. White Dental Mfg. Co.
Twentieth Century (Regular)	The L. D. Caulk Co.
Twentieth Century (Special)	The L. D. Caulk Co.
Uniform	Henry Nelms & Son
White Beauty	Lang Dental Mfg. Co.

CERTIFIED INLAY CASTING INVESTMENTS (A.D.A. SPECIFICATION NO. 2.)

Investment	Manufacturer or Distributor
Coecal Inlay	Coe Laboratories, Inc.
Coecal Universal	Coe Laboratories, Inc.
Kerr Cristobalite-Inlay	Detroit Dental Mfg. Co.
Ransom and Randolph Gray	The Ransom & Randolph Co.
Ransom and Randolph Green	The Ransom & Randolph Co.
S. S. White Inlay No. 20	The S. S. White Dental Mfg. Co.
Security Improved Inlay	The Cleveland Dental Mfg. Co.
Steele's-Super	The Columbus Dental Mfg. Co.

CERTIFIED IMPRESSION COMPOUNDS (A.D.A. SPECIFICATION NO. 3.)

Compound	Manufacturer or Distributor
Certified	Lee S. Smith & Son Mfg. Co.
Dresch	The Ransom and Randolph Co.
Kerr Black	Detroit Dental Mfg. Co.
Kerr Perfection	Detroit Dental Mfg. Co.
Kerr White	Detroit Dental Mfg. Co.
Mizzy—Low Heat	Mizzy, Inc.
Moyer	The J. Bird Moyer Co.
S. S. White—Black—Tray	The S. S. White Dental Mfg. Co.

CERTIFIED INLAY CASTING WAXES (A.D.A. SPECIFICATION NO. 4.)

Wax	Manufacturer or Distributor
Brewster	E. R. S. Brewster
Caulk-Blue	The L. D. Caulk Company
Kerr-Blue—Hard	Detroit Dental Mfg. Co.
Maves	The Heidbrink Co.
Peck's Blue	A. E. Peck Mfg. Co.
Security	The Cleveland Dental Mfg. Co.
Sterling	Baker & Co., Inc.
Taggart's Green	Mizzy, Inc.

CERTIFIED INLAY CASTING GOLD ALLOYS (A.D.A. SPECIFICATION NO. 5.)

Alloy	Type*	Manufacturer or Distributor
Aderer-A-Soft	A	Julius Aderer, Inc.
Aderer-B-Medium	B	Julius Aderer, Inc.
Aderer-C-Hard	C	Julius Aderer, Inc.
Baker Inlay Soft	A	Baker & Co., Inc.
Baker Inlay Medium	B	Baker & Co., Inc.
Baker Inlay Hard	C	Baker & Co., Inc.

Bruce "A"	A	Henry F. Bruce Co.
Bruce "O"	B	
Bruce No. 5	C	
Chilcast No. 1	A	Vernon-Benshoff Co.
Chilcast No. 1-A	B	
Chilcast No. 2	C	
Chilcast No. 2-A	B and C	
Crown Do-All-Casting	C	General Refineries, Inc.
Crown Inlay No. 2—Soft	A	
Crown Inlay No. 1—Hard	B	
Crown No. 9	C	
Crown K	A	
Crown Knapp No. 2	B	
Crown Knapp No. 3	C	
Crown T	B	
Crown TT	C	
Deetwo Light	A	Thomas J. Dee & Co.
Deetwo	B	
Dressel	C	Julius Aderer, Inc.
Goldsmith Inlay No. 1	A	Goldsmith Bros. S. & R. Co.
Goldsmith Inlay No. 2-Medium	B	
Goldsmith Inlay No. 3-Hard	C	
Jelenko Alboro Inlay	C	J. F. Jelenko & Co., Inc.
Jelenko Durocast	C	
Jelenko Firmilay	C	
Jelenko Modulay	B	
Jelenko Platin-Cast	B	
Jelenko Special Inlay	A	
Lite Wite Inlay	C	Precious Metals Research Works, Inc.
Lite Wite Hard Inlay	C	
Mowrey B. Inlay	B	W. E. Mowrey Co.
Mowrey-Special Inlay	C	
Mowrey T. Gold	B	
Mowrey TT	C	
Nelms E	B	Henry Nelms & Son
Nelms F	A	
Nelms J	C	
Ney-Oro A	A	The J. M. Ney Co.
Ney-Oro AA	A	
Ney-Oro A-1	B	
Ney-Oro A-10	B	
Ney-Oro B	C	
Ney-Oro B-2	C	
Research-A-Soft	A	Precious Metals Research Works, Inc.
Research-B-Medium	B	
Research-Inlay	C	
Research-Hard Cast No. 5	C	
Spyco Hard	B	Spyco Smelting and Refining Co.
Spyco Soft	A	
Spyco No. 6	C	
S. S. White No. 1	B	The S. S. White Dental Mfg. Co.
S. S. White No. 2	A	
S. S. White No. 13	C	
S. S. White No. 31 Metalba	B	
S. S. White No. 820	B and C	
S. S. White No. 860-Hard	C	
S. S. White No. 940	A	

Stern A-T (No. 2381)	C	I. Stern and Co.
Stern No. 2847	C	
Stern No. 3290	B	
Stern No. 3337	C	
Stern No. 3375	A	
Stern No. 3441	C	
Stern No. 3465	B and C	
Stern No. 6219	B	
Stern H (No. 6485)	C	
Tinker No. 1	B	Spyco Smelting and Refining Co.
Tinker No. 1H	C	
Tinker No. 2	C	
Tinker Inlay	B	
Williams-Klondiker	C	The Williams Gold Refining Co., Inc.
Williams-Pioneer	B	

*Relative hardness: A, soft; B, medium; C, hard

CERTIFIED DENTAL MERCURIES (A.D.A. SPECIFICATION No. 6.)

Mercury	Manufacturer or Distributor
Argentum	Hammond Dental Mfg. Co.
Chemically Pure	The S. S. White Dental Mfg. Co.
Dee	Thomas J. Dee & Co.
Dental	Goldsmith Bros. S. & R. Co.
Fellowship	Dental Protective Supply Co.
Mercury Laboratories	Mercury Laboratories, Inc.
Minimax	The Minimax Co.
Mission	Henry F. Bruce Co.
Moyco	The J. Bird Moyer Co.
Mynol	Mynol Chemical Co.
Ney's C. P.	The J. M. Ney Co.
Odontographic	Odontographic Mfg. Co.
Research	Precious Metals Research Works, Inc.
R. P. C.	Research Products Corporation
Spectropure	Baker & Co., Inc.
Twentieth Century	The L. D. Caulk Co.
Williams	The Williams Gold Refining Co., Inc. (Applies to Williams' one pound bottles only, as quarter pound containers are not glass.)

CERTIFIED WROUGHT GOLD WIRE ALLOYS (A.D.A. SPECIFICATION No. 7.)

Alloy	Manufacturer or Distributor
Aderer No. 1	Julius Aderer, Inc.
Aderer No. 3	
Aderer No. 4	
Aderer No. 20 Clasp	
Baker Q. A.	Baker & Co., Inc.
Crown Hylastic	General Refineries, Inc.
Deepep-Hard	Thomas J. Dee & Co.
High Fusing Clasp	Goldsmith Bros. S. & R. Co.
Jelenko No. 3 Wire	J. F. Jelenko & Co., Inc.
Jelenko Super Wire	
Medium Clasp	Goldsmith Bros. S. & R. Co.
Ney-Oro Elastic No. 4	The J. M. Ney Co.
Neydium 9	
Regular Clasp	Goldsmith Bros. S. & R. Co.
Spyco No. 3	Spyco Smelting and Refining Co.
Stern No. 2657	I. Stern and Co., Inc.
Williams No. 2 High Fusing Clasp	The Williams Gold Refining Co.

CERTIFIED ZINC PHOSPHATE CEMENTS (A.D.A. SPECIFICATION No. 8 First Revision)

Cement	Manufacturer or Distributor
Ames Z-M	The W. V-B Ames Co.
Caulk Crown and Bridge	The L. D. Caulk Co.
Caulk Petroid Improved	
Caulk Tenacin	
Fleck's Extraordinary	Mizzy, Inc.
Lang Dental Crown Bridge and Inlay	Lang Dental Mfg. Co.
Moyco Adamant	The J. Bird Moyer Co., Inc.
Moyco Inlay Crown and Bridge	
Moyco White Copper	
S-C	Stratford-Cookson Co.
Smith's	Lee S. Smith and Son Mfg. Co.
S. S. White Silver "A"	The S. S. White Dental Mfg. Co.
S. S. White Silver "B"	
S. S. White Zinc	

CERTIFIED SILICATE CEMENTS (A.D.A. SPECIFICATION No. 9.)

Cement	Manufacturer
Astralit	Premier Dental Products Co.
Baker Plastic Porcelain	Baker & Co., Inc.
DeTrey's Synthetic Porcelain	The L. D. Caulk Co.
Durodent Enamel	Oskar Schaefer
Smith's Certified Enamel	Lee S. Smith & Son Mfg. Co.
S. S. White Filling Porcelain, Improved	The S. S. White Dental Mfg. Co.

COMMITTEE ON LEGISLATION

MEDICAL PRACTICE ACTS: ADMINISTRATION OF ANESTHETICS BY NURSE UNDER DIRECTION OF DENTIST

THE appellee, a dentist, brought this suit in the superior court of Maricopa County, Ariz., against the state of Arizona and its attorney general, and the county attorney of Maricopa County, in their official capacities, for a declaratory judgment to determine his right to employ a nurse anesthetist. He alleged that in his practice it was frequently necessary to give a patient a general anesthetic and that he desired to employ a registered nurse, who had taken a prescribed course of anesthesia at a hospital in good standing, to administer the anesthetic under his direction and in his immediate presence. A question had arisen, however, as to whether such administration by a registered nurse was lawful and he desired an opinion from the court with respect to the matter. The superior court gave judgment to the effect that the course of conduct which he intended to follow was lawful, and the state appealed to the Supreme Court of Arizona.

The Arizona law regulating the practice of registered nurses contains the following provision:

> A registered nurse may administer anesthetics under the direction of and in the immediate presence of a licensed physician or surgeon, provided such nurse has taken a prescribed course of anesthesia at a hospital in good standing, or is a graduate in the science of anesthesia from some recognized school or college.

The specific question considered by the

court was whether a dentist, duly licensed to practice dentistry, was a "licensed physician or surgeon" within the meaning of the section just quoted, or whether for the purpose of that section these words mean a person who is licensed to practice medicine generally. The dental practice act, enacted in 1935, the court pointed out, for the first time expressly authorized dentists, in the practice of dentistry, to administer anesthetics. Before that time there was grave doubt whether under the law a licensed dentist could legally do so and it was the general practice, when such an administration was necessary, to call in a regular physician. It was clear to the court that the reason for the express inclusion in the 1935 dental act of the administration of anesthetics in the course of dental surgery as one of the things which a dentist was expected and permitted to do as a part of the regular practice of his profession was to remove any possible question as to his right to do so. There could be no question, therefore, that if the dentist in the present case himself, or any other licensed dentist, desired to administer an anesthetic to a patient, as a part of dental practice, they would be fully within their right under the law. It was contended, however, that while a dentist may administer the anesthetic himself, he may not permit a registered nurse to do it under his direction and in his immediate presence.

If, continued the court, a limited meaning is given to the words "physician or surgeon" as used in the law regulating the practice of nursing, the dentist in the present case was not a physician or surgeon within such meaning and therefore could not use a registered nurse to administer an anesthetic. But the legislature by the dental practice act of 1935 expressly gave to dentists the right personally to administer such treatment. Necessarily, by so doing, the legislature determined that a licensed dentist is fully qualified to administer an anesthetic in dental operations, which means that he knows not only how but when to give it. A licensed physician and surgeon can know no more, in the opinion of the court. To hold then that a qualified nurse may administer anesthetics in a dental operation under the direction of one man, when she may not under that of another who is equally qualified to direct her, would be to assume that the legislature had meant to permit one class of practitioners to do a certain thing, while prohibiting another class, equally qualified so far as the protection of the public health is concerned, from doing that same thing. To give the section in the nursing practice act that meaning would be to give a practical monopoly, the court thought, of the administration of anesthetics in dentistry to licensed physicians and surgeons and thus render the act invalid as an exercise of the police power. To hold, on the other hand, that the word "surgeon" as used in the nursing act includes a "dental surgeon" would make it a proper and legitimate exercise of that power. Under such circumstances, the court pointed out, every rule of statutory construction required that it be given the constitutional, rather than the unconstitutional, meaning. It was the opinion of the court, therefore, that registered nurses in Arizona may administer anesthetics under the direction and in the immediate presence of a licensed dental surgeon for the purpose of assisting in any of the operations which such surgeon is authorized to perform. The judgment of the superior court was affirmed. —*State v. Borah (Ariz.), 76 P. (2d) 757. J.A.M.A., 1939.*

AMERICAN DENTAL ASSOCIATION

EIGHTY-FIRST ANNUAL SESSION

MILWAUKEE, WIS.

JULY 17-18-19-20-21, 1939

THE eighty-first annual convention of the American Dental Association will be held in Milwaukee, Wis., from July 17 to July 21, inclusive, with the meeting headquarters in the Hotel Schroeder and the exhibits and section meetings in the Milwaukee Auditorium.

Indications are that the Eighty-First Annual Session will be one of the most successful A.D.A. meetings, from the standpoints of both attendance and scientific advancement. It is anticipated that approximately 8,000 members of the profession will be in Milwaukee.

The Official Call, issued by the President, Marcus L. Ward, and Harry B. Pinney, Secretary, summons the House of Delegates into session at 10 o'clock, Monday morning, July 17. The delegates will meet again at 2:30 p.m., Monday, and convene again at 2:30 p.m., on Wednesday and Thursday of convention week.

The General Meeting which constitutes the opening exercises of the convention will be held Tuesday at 9:30 a.m. The Second and the Third General Meeting will be held Tuesday and Wednesday at 8:15 p.m. All General Meetings will be held in the Crystal Ballroom.

Oather A. Kelly, of St. Louis, Vice President of the Association, will preside over the First General Meeting. The invocation will be delivered at 9:30 a.m. by the Rev. Raphael J. McCarthy, S. J., president of Marquette University, Milwaukee.

Governor Julius Heil of Wisconsin will then welcome the profession to the state, after which Dr. Ward will deliver the President's address. Dr. Ward will be followed by Frank E. Gannett, of Rochester, N. Y., nationally known publisher, who will discuss "Threats to Dentistry and Free Enterprise."

Percy C. Lowery, of Detroit, Vice President, will preside over the Tuesday General Meeting, at which B. Lucien Brun of Baltimore will talk about "Our Dental Centenary Celebration." Haven Emerson, M.D., of New York will also address this meeting. J. O. Hall, of Waco, Texas, Vice President, will direct the Wednesday meeting, introducing George St. J. Perrott, of Washington, D. C.

The scientific sections will open Tuesday in the Auditorium and the general clinic programs will be held Thursday and Friday afternoons.

All Milwaukee—in fact, most of the State of Wisconsin—is cooperating with the Association to assure the success of the 1939 Session. The dairy industry of the state, the state pharmaceutic association, the Milwaukee Association of Commerce, the department stores and other business and professional groups are lending a hand to make the Eighty-First Session of the American Dental Association a memorable one from every standpoint.

American dentistry takes another step forward at the Milwaukee session and every member of the profession is urged to attend the meeting.

American Dental Association
Milwaukee, Wisconsin July 17-21, 1939

HOTEL RESERVATIONS

To secure hotel accommodations for the 1939 Session, consult the rate list and fill out the attached blank. Mail this immediately to the hotel of your first choice or to the Housing Committee, Room E, Hotel Schroeder, Milwaukee, Wis. Confirmation will be sent to you by the hotel.

Second and third choices of hotel should be indicated. If the reservation cannot be made at any of the hotels of your choice, the Housing Committee will place you in as favorable a hotel as possible and will notify you.

Please remember that a reservation constitutes a contract with the hotel to provide you with the accommodations you desire. If you find it impossible to carry out your part of the contract, namely, to occupy the room at the time agreed upon, please write or wire the hotel releasing the room, in order that it may be available for other members.

RAILROAD FARES TO MILWAUKEE

Because of the reduced regular rates and round-trip fares, there is no longer any arrangement for convention rates and, therefore, there will be no convention certificates available as in the past. The new low rates for passage in Pullmans and the lower rates for travel in coaches will be in force. Summer excursion rates will be available from some sections of the country. Inquire of your station agent as to the most economical fare.

APPLICATION FOR HOTEL ACCOMODATIONS

AMERICAN DENTAL ASSOCIATION
Milwaukee, Wis. July 17-21, 1939

HOTEL.....1st choice

HOTEL.....2nd choice

HOTEL.....3rd choice

Kindly reserve the following: ☐ Single Room ☐ Double Room ☐ Twin Beds.

.....Rooms with bath for.....persons $.....per room

.....Rooms without bath for.....persons $.....per room

Arriving on July.....at.....a.m.....p.m.

ROOMS TO BE OCCUPIED BY:

NAME	ADDRESS IN FULL
.....	.....
.....	.....
.....	.....

NOTE TO HOTEL NAMED AS FIRST CHOICE: If the hotel of first choice is unable to make the reservation requested, this application should be forwarded at once to the Housing Committee, Room E, Hotel Schroeder, Milwaukee, Wis.

SCHEDULE OF RATES

ALL ROOMS WITH BATH*

Hotels	Single	Double	Twin Beds
ABBOT CREST 1226 W. Wisconsin Ave.	$2.50	$4.00	
AMBASSADOR 2308 W. Wisconsin Ave.	3.50	5.00–6.00–7.00	$5.00
ANTLERS 618 N. 2nd St. (Connecting shower only)		3.00	
ASTOR 924 E. Juneau Ave.	3.00	6.00	7.00
BELMONT N. 4th and W. Wells Sts.	2.00	4.50	5.50
CARLTON 1120 N. Milwaukee St.		3.50	6.00
GLOBE 803 E. Wisconsin Ave.		3.50	
JUNEAU 811 E. Wisconsin Ave.		3.00–3.50	
KILBOURN 624 N. Third St.		4.50	
KNICKERBOCKER 1028 E. Juneau Ave.	3.00–4.00	5.00	6.00–7.00
LA SALLE 729 N. Eleventh St.		5.00	8.00
MARQUETTE APARTMENT HOTEL 1628 W. Wisconsin Ave.		3.00	5.00
MARTIN 707 E. Wisconsin Ave.	2.50–3.00	4.00	5.00
MARYLAND 625 N. Fourth St.	2.50—3.00	4.00–4.50	5.00
MEDFORD 605 N. Third St.	2.50–2.75–3.00	3.50–3.75–4.00	5.00
MILLER 723 N. Third St.	2.25–2.50–3.50	3.50–4.00–5.00	5.50
MILWAUKEE ATHLETIC CLUB 758 N. Broadway	4.00		7.00
PFISTER 424 E. Wisconsin Ave.	3.00–3.50	5.00	6.00–7.00–8.00
PLANKINTON 609 N. Plankinton Ave.	3.00–3.50–4.00	4.50–5.00–6.00	5.00–6.00–8.00
PLAZA 1007 N. Cass St.	3.00	4.00	5.00
RANDOLPH N. Fourth St. and W. Wisconsin Ave.	2.50–3.00	3.50–4.00	5.00–6.00
REPUBLICAN 907 N. Third St.	2.50	3.50	4.00
ROYAL 439 W. Michigan St.			5.00
ST. LAWRENCE 1026 N. Jackson St.	3.00	4.50	
SCHROEDER 509 W. Wisconsin Ave.	3.50–4.00–5.00–7.00	6.00–7.00–8.00	6.00–7.00–8.00–10.00
SEVEN SEVENTY MARSHALL	3.00	4.50	
SHORECREST 1961 N. Summit Ave.		5.00	6.00
TOWER 716 N. Eleventh St.	3.00	5.00	5.00–6.00
WISCONSIN 720 N. Third St.	3.00–3.50–4.00	4.50–5.00–6.00	5.50–6.00–7.00

*Rates on rooms without bath on request.

PACKAGE LIBRARIES*

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of the

AMERICAN DENTAL ASSOCIATION

212 East Superior Street, Chicago, Ill.

Actinomycosis of head and neck.
Adamantinoma.
Agranulocytic angina.
Allergy in relation to dentistry.
Alveolar process—its structure and resorption.
Alveolectomy.
Amalgam fillings and physical properties of amalgam.
Anesthesia—discovery and early uses.
Anesthetics in children's dentistry.
Angle's orthodontic appliances.
Apicoectomy.
Articulation, occlusion and mandibular movements.
Autogenous vaccines.
Avertin in oral surgery.
Bacteria of the mouth.
Bacteriologic studies of root canals.
Bacteriologic studies of vital pulps.
Biographies of dentists.
Bite—opening the.
Bite—strength of.
Bite—taking the.
Blood examination in focal infection.
Bogue's articles from Dental Digest.
Bridges using inlays as abutments.
Broken needles.
Bureau of Standards reports.
Business side of dentistry.
Calcium metabolism.
Cancer of mouth.
Cast gold crowns.
Cast gold inlays.
Casting gold, including inlays and dentures.
Cavities—proximal.
Cavities with hypersensitive dentin—preparation of.
Cavity preparation.
Cementation of inlays.
Cements—uses and physical properties.
Centric occlusion.
Child psychology.
Children's dentistry.
Clasps—wire and cast.
Cleft lip and palate—etiology and surgical treatment.
Cleft palate—orthodontic treatment and prosthetic appliances.
Community and school dental service.
Comparative dental anatomy.
Conduction anesthesia.
Contributions dentists have made outside their profession.
Crime detection and dentistry—identification by means of teeth.
Curetting.
Cysts and tumors of mouth.
Deafness caused by retrusion of mandible. (See Retrusion of mandible, etc.)
Deciduous teeth as foci of infection.
Dental assistants.
Dental care of the preschool child.
Dental caries.
Dental caries—bacteriologic and chemical theories regarding.
Dental caries, etiology and control.
Dental clinics.
Dental disease and practice in the tropics.
Dental economics.
Dental education.
Dental health education.
Dental hygienist in the hospital.
Dental hygienists.
Dental libraries.
Dental materia medica and therapeutics.
Dental metallurgy.

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*Each package library contains information on one of the subjects listed and is composed of reprints, magazine clippings, etc., on that subject only. The packages are loaned to members of the Association for a period of one week after date of receipt. Unless the material is reserved for another borrower, an extension of time will be granted on request.

The rental fee for borrowing a package library is 50 cents. All borrowers are expected to pay this 50 cents when the package is requested. No packages are sold.

Dental students who are junior members may borrow material under the same regulations as regular members. As the Library facilities are limited, dental students other than junior members cannot be accommodated.

Dental nomenclature.
Dental service in the World War.
Dental technicians.
Dentifrices.
Dentin—its permeability, resorption, etc.
Dentistry as a career and the status of the dentist.
Dentistry in foreign lands.
Dentistry in U. S. Army and Navy.
Dentistry of the time of George Washington.
Denture bases—discussion of materials.
Denture casting.
Denture patients—education of.
Diabetes and dentistry.
Diathermy and surgical diathermy in dentistry.
Diet and nutrition in relation to teeth.
Diet in pregnancy.
Diet in relation to periodontal disease.
Distoclusion and overbite.
Dry socket.
Electrodeposition of metals for dental purposes.
Electrogalvanic lesions.
Embryology—dental.
Emphysema.
Enamel and dentin—anomalies of.
Enamel—permeability, staining, composition, etc.
Endocrine glands in relation to teeth.
Epithelial débris.
Erosion and abrasion of the teeth.
Erosion and cervical hypersensitiveness.
Eruption of teeth—dates of eruption and accompanying symptoms.
Eruption of teeth—theories regarding.
Esthetics in denture construction.
Ethics—dental.
Ethyl chloride.
Ethylene anesthesia.
Evipal in oral surgery.
Evolution of human dentition.
Examination of the mouth and oral diagnosis.
Exodontia for the general practitioner.
Extraction of teeth.
Extraction of teeth—infection following.
Extraction of teeth—use of elevators in.
Face-bow technic and recording of occlusion.
Facial prosthesis.
Fauchard's (Pierre) life.
First permanent molar.
Fixed and removable bridgework.
Fixed bridgework.
Focal infection.
Focal infection and arthritis.
Focal infection and oral sepsis in relation to gastro-intestinal disturbances.
Focal infection in relation to diseases of the eye.
Foreign bodies (of dental origin) in the lungs and esophagus.
Fractures of the jaws.
Full-denture construction.
Gagging.
Gold-foil.
Granulomas and granulomatous areas.
Growth and development of teeth and jaws.
Growth of the mandible.
Halitosis.
Hartman's solution.
Hawley's articles.
Heat and cold therapy as indicated in dentistry.
Hemophilia or excessive hemorrhage following extraction.
Histologic examination of fractured roots.
Histologic study of teeth and tissues.
Histology of peridental membrane.
History and evolution of gold crowns and inlays.
History and progress of dentistry.
History of dental ceramics.
History of dental education in U. S.
History of dentistry.
History of full denture construction.
History of the toothbrush.
Hospital dental service.
Hospital internships for dentists.
Hutchinson's teeth and effects of febrile diseases on unerupted teeth.
Hypercementosis and excementosis.
Hypnotism.
Identical twins.
Immediate denture service.
Impacted teeth and their removal.
Impacted third molars.
Impacted teeth and their relation to various physical disturbances.
Impacted upper cuspids.
Implantation, replantation, transplantation of teeth.
Impression materials and technic.
Impression materials—colloidal.
Impression taking for cast gold inlays.
Impression technic
Incidence of dental defects.
Indirect inlay technic.
Industrial dental service.
Influence of deciduous teeth and first permanent molars on occlusion.
Influence of dental improvements on appearance and mental conditions.
Innervation of teeth.
Interpretation of roentgenograms.
Investment compounds and technic.
Ionic medication.
Jackson's (V. H.) articles on orthodontic appliances.
Jurisprudence and malpractice.
Labial frenum.
Lesions of the mouth.
Leukemia.

Leukoplakia.
Local anesthesia.
Local anesthesia—contraindications and untoward results.
Local anesthetic solutions.
Lower denture construction.
Ludwig's angina.
Malocclusion—etiology of and preventive orthodontia.
Malocclusion—habits as factors in.
Malocclusion—hereditary influences in.
Masks and casts.
Massage and mastication—effect on gums.
Materia medica and pharmacology.
Matrix.
Maxillary sinus and antrum—diseases and treatment.
Membership drives, dues and delinquencies.
Milk—vitamin D, certified, pasteurized, etc.
Monson's theory.
Mottled enamel.
Mouth hygiene.
Neutroclusion.
Nitrous oxide-oxygen analgesia.
Nitrous oxide-oxygen anesthesia.
Nitrous oxide-oxygen anesthesia and carbon dioxide.
Nupercaine.
Nurses—suggestions for lectures to.
Occlusion in partial dentures.
Occlusion in relation to operative dentistry.
Odontomas.
Oral diagnosis with reference to roentgen rays.
Oral manifestations of metallic and drug poisoning.
Oral manifestations of systemic conditions.
Organized dentistry.
Orthodontia and its relation to dentistry and medicine.
Orthodontia—biologic phases of.
Orthodontia for the general practitioner.
Orthodontia—muscle exercises and training in.
Orthodontia—value of roentgen-ray examination in.
Orthodontic anchor bands.
Orthodontic appliances.
Orthodontic diagnosis and measurements.
Orthodontic diagnosis by gnathostatic methods.
Orthodontic treatment—best time for.
Orthodontic treatment of impacted cuspids.
Orthodontic treatment—place of extraction in.
Orthodontic treatment—relation of third molar to.
Osteitis deformans (Paget's disease), osteitis fibrosa (von Recklinghausen's disease) and leontiasis ossia.
Osteomyelitis of the jaws.
"Panel" or insurance dentistry.
Partial dentures.
Phonetics and speech defects.
Photography in dentistry.
Pinledge and pinlay attachments.
Plastic surgery.
Pollia's articles on radiology.
Porcelain in dentistry.
Porcelain inlays.
Porcelain jacket crowns.
Porcelain pontics.
Postoperative complications and care.
Postoperative psychosis.
Precision attachments.
Pregnancy and dental disease.
Preoperative examination of patients.
Preventive dentistry.
Preventive orthodontia.
Procaine (novocain) dermatitis.
Program building for state and district societies.
Prophylactic odontotomy.
Pulp amputation and mummification.
Pulp conservation including pulp capping and cavity lining.
Pulp pathology.
Pulp stones.
Pulp testing.
Pyorrhea.
Pyorrhea—conservative treatment of.
Pyorrhea—early recognition and treatment.
Pyorrhea—etiology and relation to systemic conditions.
Pyorrhea—history and development of treatment of.
Pyorrhea—surgical treatment of.
Pyorrhea treated by medicinal packs and instrumentation.
Rebasing dentures.
Referred pain.
Relation between dental conditions and the mental health of insane.
Relation of the dentist to the physician.
Removal of root fragments.
Removable bridgework.
Removable bridgework—discussing various types of attachments.
Research Commission reports.
Resorption of roots and bone.
Restoration of oral functions including opening the bite.
Retainers used in orthodontia.
Retention of deciduous teeth and delayed eruption of permanent teeth.
Retrusion of the mandible causing impaired hearing.
Roofless dentures.
Root canals and pulp chambers—anatomy of
Root-canal treatment.
Root-canal treatment in deciduous teeth.
Saint Apollonia.
Saliva—abnormal secretion of.
Saliva—influence of diet on.
Saliva—various studies of or pertaining to.

Salivary calculus.
Salivary glands.
Shock, syncope and collapse.
Should dentistry be advertised?
Silicate cements (see cements—uses and physical properties).
Silver nitrate.
Social and economic phases of dentistry and other health services.
Soldering.
Space retention—its importance and methods of accomplishing.
Staining porcelain teeth.
Stainless steel and chrome alloys.
Stainless steel for orthodontic appliances.
Status of dentistry in our social and economic system.
Sterilization of dental instruments.
Stomatologic program (A.S.S.).
Stomatology—general discussions of.
Stories and rhymes for children.
Suggestions for talks to mothers.
Suggestions for talks to students.
Syphilis in relation to dentistry.
Teeth—composition and chemical analysis of.
Teeth—congenitally missing.
Teeth—supernumerary.
Teeth—mutilation and adornment of.
Temporomandibular joint.
Three-quarter crowns.
Thumb-sucking.
Tongue—diseases of.
Tooth forms and arrangements for full dentures.
Tooth structures—permeability of.
Toothbrushes and toothbrushing technic.
Toothbrushes, toothpastes and mouthwashes.
Torus palatinus.
Transplantation of teeth (see implantation of teeth).
Traumatic occlusion.
Trigeminal neuralgia.
Trismus and ankylosis.
Tuberculosis and dentistry.
Ultraviolet-ray therapy in dentistry.
Undergraduate and graduate orthodontic education.
Value of dental service in schools.
Vinethene or vinyl ether.
Vincent's infection.
Vulcanite and vulcanite stomatitis.
Waxes and wax expansion method.
Willett's articles.

THE DENTAL INDEX

Numerous requests have been received for information regarding the date of publication of the Dental Index covering the period 1936-1938. The material for this volume is now about ready for the printer and it is expected that the Index will be published some time in August. This, the fifteenth volume of the Dental Index, will complete the indexing of 100 years of dental periodical literature. The style will be the same as that of those volumes previously published.

Starting with 1939, a new stye of Index was established, using subject headings instead of classification numbers. In compiling the list of subject headings to be used, consideration was given to those previously used in the Black Dental Index, those suggested by various librarians and dentists and those used in the Quarterly Cumulative Index Medicus. A list of the new subject headings is available in mimeographed form and will be sent to librarians or dental editors who request it.

The general style of the Index is similar to that of the Quarterly Cumulative Index Medicus published by the American Medical Association. The author and subject references will be alphabetized together and articles will be found under both author and subject.

The printed volume of the Dental Index using the new style and covering the period 1939-1941 will not be available until 1942, but those who wish to do so may subscribe to monthly cards which index the dental periodical literature. Subscribers will receive 300 cards each month, including the more important articles in the English language selected from the dental literature published throughout the world.

BUREAU OF PUBLIC RELATIONS

WHAT DOES THE A.D.A. DO FOR ME?

By Lon W. Morrey, D.D.S., Chicago, Ill.

"WHAT does the American Dental Association do for me?" "What does organized dentistry do for me?" The terms, "American Dental Association" and "organized dentistry" are, in a sense, synonymous. Certainly they are used synonymously by most dentists. In attempting to answer this question, which is so often voiced by many members of the Association and which, no doubt, is in the minds of many more, it is necessary to give the terms equal value.

Membership in an organization entailing the payment of dues can be considered a business transaction. Any business transaction, to be wholly successful, must represent an equal exchange of goods. The trader exchanges a pound of butter for an amount of flour of equal value. The merchant exchanges a suit of clothes for an equivalent amount of money. An organization exchanges certain services for monthly or yearly dues. Let us, therefore, attempt to weigh the services or goods furnished by the A.D.A. against the annual dues of the individual member; or, putting it differently, let us weigh the contributions of organized dentistry against the contributions of the individual and see which way the scale tips.

In considering this problem, then, as a business proposition, two transactions are involved: (a) the initial transaction between the dental student and organized dentistry and (b) the secondary transaction between the practicing dentist and organized dentistry. In the initial transaction, a young man chooses to become a dentist. He has a high school education, which, unless he has special native ability, enables him to earn from $80 to $150 a month.[1] Being dissatisfied with the prospect, he selects a dental school and, for a determined number of years, subjects himself to a thorough and rigorous training in the fundamentals of his chosen profession. In return for that training, he exchanges a certain amount of money. Six years' tuition, the cost of books and laboratory fees amount to approximately $2,400.[2] This, of course, does not include living expenses, which the student does not pay to organized dentistry. This, then, is the initial transaction. For the $2,400 which the student pays to the dental college and consequently to organized dentistry, he receives an education which permits him to raise his average potential income from $1,600 a year to an average of $3,600[3] a year for the remainder of his productive days. Assuming that he practices for thirty-five years, this initial transaction raises his potential income from approximately $65,000 to $126,000. Had it not been for organized dentistry, this young man could not have received, for $4,000 or for four times $4,000, a comparable dental education.

The excellent fundamental training which he received in dental college was made possible entirely by organized dentistry. Its forces collected, screened and selected the best contributions of past and contemporary scientists and, through the medium of the lecture room, laboratory and instructor, prepared the student to practice. The fee which the student

paid in exchange, high as it seemed at the time and high as it was, by no means compensated for the time, thought and energy expended to make his education possible.

The history of American dental schools is a chapter in the history of American dentistry. The teaching staff, the teaching facilities, the curriculum itself are made possible by organized dentistry. Visualizing the conditions that existed a little less than a hundred years ago will help drive that point home. Then there were no dental schools, no dental periodicals and no dental societies. Dentists had no standards of education, no means of interchange of knowledge and no professional standing in society. Comparable conditions would prevail today if organized dentistry did not exist.

The quality of American dentistry is conceded to be the highest in the world. As evidence of that fact, one has but to compare dental educational standards with those of a half century ago. Fifty years ago, an American dentist who wished to complete his education attended a European school, preferably one in Germany. Today, this situation is just reversed. Foreign dentists who can do so come to America to complete their education. In 1938, there were 171 foreign dental students in the U. S. dental schools.[4] The elevation of American dental educational standards in the past twenty years can be attributed to a large extent to the work of the Dental Educational Council, which is distinctly an activity of organized dentistry.

If the American Dental Association had done nothing more than raise the standard of dental practice to its present high level; if organized dentistry had done nothing more than elevate dentistry from an undignified trade to a respected branch of the healing profession; if it had done no more than raise the status of the dental practitioner from lowly itinerant craftsman to respected professional person, it would merit its existence and deserve the wholehearted support of every practicing dentist.

Judged, then, from a business standpoint, the dentist receives infinitely more than he pays in this primary transaction between himself and organized dentistry. From the moment he graduates until he lays aside his instruments at the end of his professional career, the dentist, whether he admits it or not, is organized dentistry's debtor.

If organized dentistry's services ended, however, at the day of graduation, many of us would not progress far beyond the college campus. The services rendered in the second transaction, between the A.D.A. and the dentist, are more complex and perhaps less understood than, but just as important as, the services rendered in the first transaction. The American Dental Association carries on where the dental college leaves off. It furnishes facilities whereby every member can keep himself well informed as to the newer developments in dentistry. It enables him to provide his patients with the latest and best in dental care. It makes it possible for him to protect himself against law suits and litigation arising from his practice. It is instrumental in passing laws which protect his livelihood. It improves his social standing. It protects him and his patients against the unscrupulous manufacturer of drugs and materials. It enables him to protect his family by permitting him to secure insurance at a very low rate. It provides him with relief should he need it at any time in his career, and it has changed and is changing the public concept of dentistry so that more people are coming to his office. For all of these services provided by organized dentistry through the American Dental Association, the individual dental member pays $4 a year. Assuming that he practices for thirty-five years, he pays in his life time a grand total of $140. Before attempting to evaluate this transaction or to measure

it with a business yardstick, let us study some of the services he receives.

The most obvious and perhaps best known of these services is the continuous postgraduate course offered through the pages of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. On the first of every month, the Association mails each member approximately 170 pages of articles on different phases of dentistry. Not one month passes that the discerning dentist does not find one or more articles that will help him in his individual practice. In addition, the pages in the advertising section of THE JOURNAL act as a buyer's guide enabling the member to purchase the best materials offered by dental manufacturers. If he confines his purchases of dental supplies to articles advertised in THE JOURNAL, the member need have no fear of buying inferior goods. Thus, automatically, he protects his patients and himself against inferior materials, because such materials cannot be accepted for advertising in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. The scientific papers, "Practice in Paragraphs" and the socio-economic and legislative articles and the practical information found in the advertising section combine to make THE JOURNAL the outstanding dental publication of the world. As one appreciative reader in Bulgaria writes: "What a wealth of information it [THE JOURNAL] contains! Truly, organized dentistry in the U.S.A. is to be congratulated on having such a service." Hundreds of similar letters are received annually from readers in every corner of the globe. There is no doubt that THE JOURNAL alone more than compensates the member for his annual dues.

However, the postgraduate services do not end with THE JOURNAL. Each year at the Annual Session, the Association presents approximately 100 papers or essays, 400 table clinics and 100 scientific exhibits on every phase of dentistry and associated subjects. In addition, it presents more than 100 commercial exhibits, demonstrating the newest and highest type of dental products and equipment.

While it is true that all members cannot attend all national conventions and thus avail themselves of the services just mentioned, it is likewise true that many more men could attend were they so disposed. Organized dentistry makes it possible for the thoughts, works and achievements of hundreds of men both inside and outside the profession to be presented to the members of the Association at no additional cost. Were it not for organized dentistry, it would be practically impossible for the average dentist in a lifetime to learn much about the works of others. The intricate, multitudinous and cooperative organizational activities make it possible, through the pages of THE JOURNAL and through the medium of the Annual Session, to acquaint every member with every new development almost as soon as it is evolved.

If the American Dental Association or organized dentistry did nothing more than provide its members with THE JOURNAL and the Annual Session, it would, it is estimated, give infinitely more than value received for the $4 annual dues. These, however, are but two of the many services rendered. There are others of equal importance. Besides providing the services of its President, President Elect and Board of Trustees, who serve gratuitously, organized dentistry provides its members with the services of hundreds of committeemen—men inside and outside the profession who also labor without pay and whose only remuneration is the satisfaction that they receive in serving the public and the dental profession. I refer specifically to the contributions of the Research Commission, the Council on Dental Therapeutics, the Legislative Committee, the Economics Committee, the Relief Commission, the Judicial Council, the Insurance Committee, the Dental Health

Education Committee and the National Health Program Committee.

Located in the Central Office at 212 East Superior Street, Chicago, an administrative and clerical staff of twenty-seven persons serve the Association. These consist of the Secretary, Treasurer, Business Manager, Editor, Librarian, Director of the Bureau of Chemistry and the Director of the Bureau of Public Relations and their assistants.

A few of the services rendered by the Association's bureaus and committees are herewith briefly reviewed.

THE BUREAU OF CHEMISTRY AND THE COUNCIL ON DENTAL THERAPEUTICS

Prior to the establishment of the Council on Dental Therapeutics in 1930, the dental profession and the public were entirely at the mercy of therapeutic manufacturers as far as dental medicaments were concerned. Although the passage of the Federal Food and Drug Act of 1906 did much to improve the therapeutic preparations used by dentists and the public, many manufacturers evaded the law by varied and devious methods. Certain tooth bleaches and dentifrices and cures for pyorrhea were sold to the public on the basis of extravagant claims and promises. Hundreds of unsuspecting dentists were led by glib-tongued agents and manufacturers to use and recommend for their patients' use questionable and sometimes actually harmful concoctions. It was, and is, impossible for the busy practicing dentist to be fully conversant with the ingredients of all therapeutic preparations. Prior to the establishment of the Council, the dentist had no one to turn to for unbiased and dependable advice. Since 1930, there has been no reason for any dentist to use or prescribe any unaccepted medicament.

The Council on Dental Therapeutics of the A.D.A. consists of ten active members, five of whom are dentists and five of whom are engaged in the fields of medicine and chemistry. None of these men are paid for their long and arduous hours of service. Their contribution is made for the advancement of dental science and for the improvement of public health.

The Bureau of Chemistry is equipped with a modern laboratory and manned by capable chemists. The technical reports of the Bureau enable the Council to evaluate products in the light of scientific evidence. Under this scrutiny come not only products used by the dentist, but also those sold directly to the public. Through this work, a number of harmful products have been removed from the market and others have been improved. Some of the preparations exposed by the Council have been condemned by the government under the Pure Foods and Drugs Act and the Federal Trade Commission Act.

The findings of the Council on all products which it examines are reported in the association JOURNAL. Acceptable materials are awarded the "Seal of Acceptance" and are listed in "Accepted Dental Remedies," a publication of the Council. This excellent booklet is made available to all dentists and to others interested in dental therapeutics for the nominal sum of $1. It is revised annually so that every dentist can be kept fully informed regarding the standards of the medicaments which he uses in practice.

Ethical pharmaceutical manufacturers, appreciative of the services of the Council on Dental Therapeutics, now prepare and offer their products with due consideration for the interests of the profession and the public.

THE LIBRARY BUREAU

There was a time when the dentist who encountered a special problem in practice had no ready reference for information and guidance. All he could do was to refer to his own limited library for help. Organized dentistry has rectified that condition. The A.D.A. places

at the disposal of every dentist the services of a highly trained and efficient library staff and a collection of books and magazines unequaled in the country. Today, a dentist who, facing a baffling problem, is unable to obtain the assistance of a consultant may wire or write the Library Bureau and obtain the latest printed information on the subject.

The Package Library Service alone saves hundreds of members the cost of their annual dues each year. It would save others an equal amount were they disposed to use it. Package libraries consist of a loose leaf compilation of from a dozen to fifty or more articles on a particular subject. Members wishing information on any phase or branch of dentistry may borrow one or more of these packages. More than a thousand packages are available, covering 300 phases of dentistry.

The Library Bureau also circulates and and sells books to members. Many dentists find this service invaluable in their practice.

THE DENTAL INDEX

In addition to the valuable services rendered by the Library Bureau, the Association, through its Dental Index Committee, has compiled a complete classified index of all dental articles published since 1839 in the English language throughout the world. This index is published at three-year intervals. In addition to the classified index, each volume contains an author index. Thus, organized dentistry compiles and preserves dental literature for the profession and for posterity.

THE BUREAU OF PUBLIC RELATIONS

For many years, the public was dependent on advertisements of tooth pastes, toothbrushes and mouth washes for its knowledge as to how to maintain the health of the mouth. To disseminate unbiased, authentic information on the many important facts of preventive dentistry, the Bureau of Public Relations was established.

This Bureau educates the public by means of books and pamphlets, newspaper articles and radio talks. Films, stereopticon slides and exhibits are prepared for use in schools and at state and county fairs, public health meetings and parent-teacher meetings throughout the nation.

Every year, more than 500,000 pieces of special educational material are distributed by the Bureau through dentists and through schools, as well as through health and welfare organizations. Thus, more than 42,000 pieces of educational material are mailed each month, or approximately 2,000 pieces each working day of the year. The greater part of this material is used by teachers, nurses, hygienists and public health workers. The activities of this Bureau have stimulated thousands of people outside the dental profession to act as emissaries of dental health.

In addition to distributing printed material, the bureau, through the loan of films and stereopticon slides and through its weekly radio broadcasts, reaches hundreds of thousands of individuals each year. The 1938 poster contest alone, it is conservatively estimated, directly reached 2,000,000 people. Thus, through the Bureau of Public Relations, organized dentistry is able to carry on an educational program that would be utterly impossible were dentists to work alone.

All of the material prepared or assembled by the Bureau is approved by the Dental Health Education Committee of the A.D.A., and much of it is approved by the U. S. Public Health Service before it is released to the public. The members of the Dental Health Education Committee serve without pay and naturally the public health officials are not remunerated. Thus, again, through organized dentistry, the services of experts outside the profession are available, services which cannot be purchased and

which could not be obtained by individual dentists.

As rapidly as time and available money permit, the Bureau of Public Relations is developing a collection of educational material suitable for all age levels, for all occasions and for various groups of people, besides material that the dentist can use in his own private practice.

Within the last year, a publicity service has been added to the Bureau's activities. Once each month, a news story on dentistry is issued to a selected list of 2,000 newspapers. In addition, timely and authentic stories are furnished the various wire services, and special dental articles are supplied to selected magazines. During the past twelve months, the newspaper stories appeared in all forty-eight states and in 3,379 towns. The total lineage secured was 2,175,571 lines, reaching a circulation of 53,428,671.

The Bureau's work has resulted in a new national awareness of the importance of dental health and the proper methods of maintaining it. Slowly but surely, the work of this Bureau is changing the public's concept of dentistry. It is awakening the minds of millions to the importance of dental health. It is influencing our citizens to seek the advice and help of the family dentist.

THE RESEARCH COMMISSION

Research is the foundation upon which any science or profession is built. The contributions made by the Research Commission of the A.D.A. share equal honors with the Association's educational and legislative endeavors. The activities of the Research Commission are divided into biologic and physical research. For several years after its creation in 1913, the Commission dealt largely with biologic research. In later years, its best known work has been in physical research; that is, it has concerned itself largely with the problem of developing standards for dental materials, standards which will provide dentists with the highest type of restorative substances. To date, eight standards have been developed: standards for amalgam, inlay casting investments, impression compounds, inlay casting waxes, inlay casting golds, dental mercury, wrought gold wire and zinc-phosphate cements.

The Commission has established four fellowships at the United States Bureau of Standards in Washington, D. C. The men examine dental materials and set up specifications which the manufacturer is required to meet. There is now no necessity for any dentist to use inferior merchandise.

Here again is a concrete example of how organized dentistry, by cooperating with other organizations, is able to offer its members a service which it would be utterly impossible for dentists working alone to obtain.

At the present time, the Research Commission is completing a world-wide study on dental caries, and it is planning an intensive research study on the etiology of dental decay. All told, organized dentistry has allotted more than $400,000 through its Research Commission to improve the quality of dental service and dental materials.

THE LEGISLATIVE COMMITTEE

Were it not for organized dentistry, individual dentists and the public would be powerless against unscrupulous, self-seeking individuals. It has required years of unrelenting, tireless energy on the part of this committee to perfect laws to protect the public. The same laws protect the ethical, honest dental practitioner and have helped raise the standards of dentistry so that dentists enjoy the high respect of the public. In addition, the committee has been active in preventing taxation of dental materials, which would greatly increase the cost of dental care to the public.

THE JUDICIAL COUNCIL

Prior to the formation of the American Dental Association in 1859, the conduct of each dentist was regulated by his own conscience. During the passing of the years, the Association has been able to develop an organization conscience—a set of rules and regulations that helps every member throughout his professional career. Naturally, this has resulted in raising the moral and ethical standards of the profession as a whole. It is a positive rather than a negative force. It has lifted dentistry to a higher plane of usefulness; and it has been the means of establishing confidence between fellow practitioners and between practitioners and the public. Ethics begets honesty, and while it is trite to say that honesty is the best policy, experience proves that although trite it is true. Strict adherence to the Code of Ethics brings, in time, its own reward. The occasional skyrocket flight and brilliant performance of the unethical practitioner usually ends like his Fourth of July counterpart—a burned out, broken stick in a field of mud.

The Code of Ethics prescribed by the A.D.A. for its members is safeguarded by the Judicial Council. By enforcing the Code of Ethics, the Council prevents detrimental practices, for the protection of the public and for the general good of the dental profession.

THE INSURANCE COMMITTEE

Through the activities of the Insurance Committee, organized dentistry offers a contribution to every member that recompenses him many times over for his annual dues. Only by the use of the collective purchasing power of the Association are dentists able to obtain $3,000 of group insurance at such low rates. Every member in good standing in the A.D.A. who has not passed 50 is eligible to apply for this insurance. Evidence of good health is, of course, also a requirement, but this is usually limited to a short nonmedical application form. Dentists past 51 can continue to carry this low-rate insurance, although no new policies are issued to men beyond those years.

The annual premiums range from $18.50 per $3,000 for members between the ages of 21 and 30, to $49.50 for members between 51 and 75 years of age. This represents a savings of approximately 40 per cent, on the average, over the cost of any similar coverage available to members as individuals. In short, members below 30 years of age who own an A.D.A. policy save $7.40 a year, almost twice their annual A.D.A. dues. Members over 51 years of age save $19.76, almost five times their annual dues. Every sagacious dentist should carry one of these policies to help protect his family in case of his death and actually to save money in doing so.

MALPRACTICE INSURANCE

As evidence of the esteem for organized dentistry on the part of those outside the profession, it must be stated that, at the present time, no American insurance company will knowingly issue malpractice insurance to any dentist who is not a member of the American Dental Association. Nonmembers of the Association are, according to certain information, forced to secure malpractice insurance from an English company the value of whose protective insurance is very much in dispute. To be able to secure high grade malpractice insurance, without which no dentist should practice, is worth many times the annual A.D.A. dues.

THE RELIEF COMMISSION AND RELIEF FUND

The San Francisco earthquake and fire in 1906 form the background for the foundation of the A.D.A. Relief Fund. The sum of $15,208.45 was raised by American dentists for the financial relief of their San Francisco brothers. Of this, $3,969.75 remained unused. This residue

was turned over to the National Dental Association in 1907 to be used as a nucleus for a national dental relief fund.

In the past thirty years, this fund has grown from approximately $4,000 to about one-half million dollars. This increase has been largely due to the annual sale of Christmas Seals. Interest on this money is used to supply financial aid to aged, needy dentists and to the wives and orphans of dentists who have died impoverished. Since 1925, 225 dentists have received aid. At the present time, more than fifty dentists are on the A.D.A. relief rolls.

During the past thirteen years, $171,606.34, half from the Relief Fund and half contributed by state societies, has been disbursed by organized dentistry for relief purposes. The contributions of the Relief Commission and Relief Fund are concrete evidence of the value of organization. It definitely demonstrates what can and has been accomplished by cooperation. By no possible means could this type of service be rendered except through properly directed organization.

It is not necessary to continue with a detailed description of other A.D.A. activities. It is important, however, to note that the number of expense items has increased from sixteen in 1928 to twenty-eight in 1938. In other words, the American Dental Association has added twelve new activities in ten years at no additional cost to the individual member. The fact that twelve new services have been added to A.D.A. activities in ten years indicates the increasing demands that are being made on organized dentistry to meet new social conditions. The A.D.A. can care for the demands of dentists only in proportion to the support which dentists give the Association.

The expense items which have practically doubled in one decade have been underwritten by the Association at no extra expense to its members. In themselves, they are mute evidence of the economical and efficient manner in which the Association is being operated. In no other national professional organization are the dues so low as those of the A.D.A. In fact, most are 100 per cent or more higher. Compare the services rendered by the A.D.A. with the services rendered by any other organization to which you belong. Weigh those services against the dues, then draw your own conclusions.

Finally, and as a concluding argument, let it be known that for every $4 dues paid into the American Dental Association, organization makes possible an approximate additional $4 income, all of which is used for the improvement of dentistry and for the betterment of the dental service rendered the public. This additional income is derived from the sale of advertising space in THE JOURNAL, from the sale of space to commercial exhibitors at the annual convention and from interest on careful investments.

If each member's dues were broken down and allocated to each expense item, it would read something like this: Each member pays annually $1.39 for THE JOURNAL, 44 cents toward the annual meeting, 33 cents toward administrative expense, 18 cents for research, 37 cents for public education and 18 cents toward the work of the Council on Dental Therapeutics and the Bureau of Chemistry.

Do you know of any expenditure of 18 cents which you have made in the past year that means more to you individually and to the profession collectively than the work of the Research Commission or the Council on Dental Therapeutics? Is it worth 37 cents a year to have organized dentistry educate the public to appreciate dental health? The answer is obvious.

In summing up, then, the contributions of the American Dental Association to dentistry and in weighing them against each personal contribution, it is found that the A.D.A. member receives the services of twenty-eight committees, bureaus and departments, all of which are actively engaged in furthering his

personal professional interest. Hundreds of men both inside and outside the Association are contributing their time, their thoughts, their scientific and organization efforts for his professional welfare. His contribution for all of these services is $140 for an entire lifetime—0.001 per cent of his potential professional net income —$4 a year, or 1.1 cents a day. Surely, no just man can say that organized dentistry has been weighed in the balance and found wanting.

Dentistry as practiced today is the result of the composite contributions of thousands of our forefathers and confrères—contributions freely poured into the stream of dental knowledge for the benefit of all. And we may think of dentistry as a moving stream; a moving stream of knowledge fed by many and varied contributors, small and large, shallow and deep. These waters give life to those of us who live along its winding course. Occasionally, vitalized by its nourishment, a member will grow sufficiently to dig a well of his own, the waters of which will help to enrich the stream for those to follow, and thus is the river broadened and bettered as life flows on.

All of us cannot contribute research; all of us cannot contribute organization ability; most of us can, however, contribute our mite to help make those other and more important contributions possible. In realizing the scientific contributions which others have made to the profession and in summing up the contributions which organized dentistry has made and is making to the public and to each member, and after reviewing its many, varied and useful activities, we should ask in all humbleness, not "What does organized dentistry do for me?" but "What have I done for organized dentistry?"

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212 East Superior Street.

DENTAL ECONOMICS

STATEMENT OF THE A.D.A. NATIONAL HEALTH PROGRAM COMMITTEE AT HEARING ON NATIONAL HEALTH ACT OF 1939, HELD JUNE 1, WASHINGTON, D. C.

IN July 1938, the National Health Conference was held in Washington, D. C., and, at the same time, the National Health Program was first made public.

February 28, 1939, Senator Robert F. Wagner, of New York, introduced into the United States Senate a bill which attempts to translate the National Health Program into legislation. This bill is known variously as S. 1620, the National Health Act of 1939 and the Wagner Health Bill.

This bill was referred to the Senate Sub-Committee on Education and Labor, of which Senator Murray, of Montana, is chairman. Other members of the subcommittee are: Senator Ellander, of Louisiana, Senator LaFollette, of Wisconsin, and Senators Taft and Donahey, of Ohio. For some time, this subcommittee has been holding hearings on the bill.

The American Dental Association asked for an opportunity to be heard on this bill and this request was granted June 1, at which time the National Health Program Committee of the American Dental Association appeared before the subcommittee. A statement presenting the views of the American Dental Association was read. This statement was prepared by the members of the National Health Program Committee, Drs. C. Willard Camalier, Leroy M. S. Miner, Alfred Walker, Raymond C. Walls, and Harold W. Oppice, chairman, in collaboration with the committee's technical advisers, Drs. Lon W. Morrey and Harold Hillenbrand.

After the reading of the statement, the members of the National Health Program Committee discussed various points with the senators of the subcommittee. In the course of this discussion, it was stated that the National Health Act of 1939 would not achieve passage in the current session of the Congress, but that it would form the basis of legislation at a future session.

The statement of the National Health Program Committee follows:

STATEMENT OF THE AMERICAN DENTAL ASSOCIATION REGARDING S. 1620

The organized dental profession in the United States, through its official body, the American Dental Association, has repeatedly expressed its deep interest in the relationship between dentistry and the public health and in the problems of distributing more dental care to larger groups of the population. To the rise of American dentistry, which is now universally acknowledged as having achieved world leadership, the American Dental Association has made many definite and substantial contributions.

There are approximately 62,000 practicing dentists in the United States and there are 45,768 members in the American Dental Association. This high percentage of representation and its long record of interest and activity in the matters of public health give the Association the competence and right to speak on any program that involves dentistry. Since S. 1620 proposes to include the services of dentists in a national health program, the American Dental

Association is appreciative of this opportunity to place before you its views on the subject.

In spite of the fact that the American Dental Association represents dentistry in this country, it was not officially invited to participate in the National Health Conference, held in Washington, July 18, 1938, although four of its members were extended personal invitations to attend and its president was granted the privilege of the floor during the conference. It was at this conference that the National Health Program, which S. 1620 attempts to translate into legislation, was first revealed.

At the first opportunity thereafter, October 24 to 28, 1938, The House of Delegates of the American Dental Association, nevertheless, considered the published proposals of the conference and, in the best interests of the public and of the profession, evolved a group of principles that should govern the participation of dentistry in any national health program.

In an effort to place these essential principles before the proper agencies, the American Dental Association asked for a conference with President Roosevelt's Interdepartmental Committee to Coordinate Health and Welfare Activities and appointed a committee for that purpose. This conference was held with several members of the Technical Committee, and the Association presented its suggestions as to changes that should be incorporated into the National Health Program.

The report of the Interdepartmental Committee was later transmitted to the President and by him to the Congress for study. This report was supposed to furnish the basis for future legislative proposals, of which S. 1620 is the first. It must be noted that not a single change or proposal suggested by the Association is incorporated in either the final draft of the National Health Program or in S. 1620. This points plainly to the fact that both the program and the bill were prepared without making any use of the available experience and knowledge of the only body professionally qualified to speak on the subject.

The attitude of the American Dental Association toward all efforts to formulate an efficient, feasible and comprehensive national program for dental health has been one of leadership and cooperation. The Association has consistently favored, upheld and fostered the objectives that motivate the National Health Program and S. 1620. The American Dental Association is professionally concerned with four of the main divisions of both the National Health Program and S. 1620 because only these have dental applications. In considering these four divisions, the Association has expressed its opposition only to the principle employed in one division, that which makes possible the establishment of a system of compulsory health insurance in this country. In all of the other divisions, however, the Association has cooperated by suggesting various changes by which these common principles could be more effectively advanced.

In addition to this single objection to principle, namely, that of compulsory health insurance, the further objections which we now present are directed against the *methods or mechanisms* provided in the bill, and against the essential *methods or mechanics* that have been omitted.

A short preliminary statement on the unique position of dentistry in a national health program is essential to a full understanding of the Association's position in regard to S. 1620.

There are certain definite differences between the problems of dentistry and those of the other health service professions. These differences arise out of the peculiar problems presented by dental disease and are based on the following facts:

1. The occurrence of dental caries (decay of the teeth) is almost universal. No

other disease afflicts such a large part of the population almost constantly; with the result that no other profession is confronted with similar problems in prevention and control.

2. Dental decay, unlike many other diseases, never heals of itself, always requiring the technical intervention of the dentist.

3. Dental disease does not ordinarily manifest itself in the striking, unmistakable way that many other diseases do, and thus dental disease is often allowed to go untreated, even when treatment is readily available, until its extent is so great that repeated attacks of pain, an unsightly appearance or systemic involvements demand a service that is more extensive and consequently more costly. Therefore, any successful dental program must involve the education of the public to recognize the danger in these insidious attacks of dental disease.

4. The cause of dental decay is not yet scientifically established in spite of intensive research, most of which has been conducted by the American Dental Association and dental schools and foundations. The United States Public Health Service, in cooperation with the American Dental Association, has also made some studies in this field.

5. The present state of knowledge of the cause of dental decay indicates that the prevalence of the disease can be reduced by proper measures as to diet, oral and general hygiene and early corrective treatment for children. These measures can be made more definitely effective when the cause of dental decay is scientifically established.

In the light of these facts, the objections of the American Dental Association to S. 1620 are more easily understood.

The American Dental Association is opposed to S. 1620 in its present form. It takes this opportunity to explain this opposition in relation to the principles established by its House of Delegates for the participation of the Association in a national health program.

The first principle established by The House of Delegates of the American Dental Association, October 1938, is as follows:

> In all conferences that may lead to the formation of a plan relative to a national health program, there must be participation by authorized representatives of the American Dental Association.

This principle has been consistently ignored by those charged with the formulation of the National Health Program upon which S. 1620 is supposed to be based. The American Dental Association was not officially invited to participate in the National Health Conference. This Association did not receive an invitation to confer with the Technical Committee until one was requested. The Association, however, felt that it must make its contribution to these enterprises and submitted its principles and proposals. Not one of these suggestions or changes has been incorporated into either the National Health Program or S. 1620.

This indicates a refusal to recognize the official body of American dentistry and to make use of the knowledge and experience which that organization has acquired and also raises the question of future policy in regard to this important matter. It does not seem logical that this Association should not have something of value to contribute to the formulation of a National Health Program after its many years of constructive service to the public health.

The second principle established by The House of Delegates of the American Dental Association, October 1938, is as follows:

> The [national health] plan should give careful consideration to: first, the needs of the people; second, the obligation to the taxpayers; third, the service to be rendered, and fourth, the interests of the profession.

1. "The plan should give careful con-

sideration to, first, the needs of the people. . . ." The American Dental Association is of the opinion that S. 1620 will not satisfy the needs of the people because it implicitly promises a program which the government would be unable to deliver under the appropriations established by the bill.

On the other hand, S. 1620 is worded so vaguely and its authorities are so obscurely designated that it would be possible for administering officials arbitrarily to withhold essential dental service from a national health program. The Association believes that there can be no debate as to the value of dental service to the general health of the nation. Irrefutable scientific and clinical evidence has demonstrated that some dental service is absolutely necessary in any program that proposes to have a permanent and effective influence on the national health.

The "needs of the people," in the opinion of the Association, are not satisfied by any bill which allows such extreme latitude in the inclusion of dental service in a national health program.

2. "The plan should give careful consideration to . . . second, the obligation to the taxpayers. . . ." Organized dentistry, as such, does not have its primary concern with the origin of funds that are to be used to furnish dental service to the public in a national program. The members of organized dentistry, however, do have an interest in the source of these funds because: (a) They are obligated to pay taxes the same as other citizens. (b) They are engaged in a professional health service which has its first duty to the public and community welfare, and therefore any program which proposes the collection of community funds for dental service immediately becomes of interest to the dentist. (c) Dentists, as members of the profession, individually and collectively, have always made substantial contributions of their time and services to those who were in need of them. If a program is to be established which proposes to pay dentists for this service heretofore freely rendered, they have a right to know who is to assume the burdens of such payment.

This bill does not curtail any existing activity of government and therefore proposes new expenditures out of tax moneys. Further, if federal subsidy is to be matched by state funds, the states will have to curtail existing activity or raise new tax moneys to participate in the program. This could be justified if the mechanisms proposed by the bill could be clearly shown to achieve the desired objectives. In the absence of such demonstration, S. 1620 works unfairly against those who must pay for the enterprises.

S. 1620 employs the proper principles when it specifies unification of health activities in the state. S. 1620 does not, however, provide for this essential integration in the health activities of the federal government. In support of this, we cite the fact that at least one important health bureau of the federal government has not been placed under the jurisdiction of the newly proposed Bureau of Federal Security. The cost of maintaining these agencies without proper integration in both federal and state government will be an unjustifiable burden on the taxpayer.

The expenditure of tax money for a dental program that does not include essential measures for the prevention of defects and therefore a future lessening of the tax burden is uneconomic and an unnecessary burden on the taxpayer.

3. "The plan should give careful consideration to . . . third, the services to be rendered. . . ." S. 1620 places ultimate control of medical and dental services in the hands of agencies which are at present under lay control. Therefore, the bill does not provide sufficient guarantees to insure a high quality of service; to allow dentistry to advance unhampered under the normal impetus of scientific investigation and research, and to prevent its

deterioration under improper control, lax standards and lay administration.

S. 1620 does not provide for professional policy boards whose advice will be effective. Thus, a mechanism for administering professional services could be provided under the terms of the bill without giving consideration to those specifically trained and experienced in that work.

S. 1620 provides that the federal government will not participate in an expenditure "in excess of $20 annually per individual eligible for medical care under such a plan." There is satisfactory evidence that even if this entire sum were to be devoted to dental service, as assuredly it cannot be, it would not be sufficient to provide for each individual the necessary amount of quality dental service that is needed. This fact makes it extremely important that expenditures for a national dental program primarily be used for the definite purpose of decreasing the need for dental care in the future so that the burden of cost will become of manageable proportions.

4. "The plan should give careful consideration to . . . fourth, the interests of the profession." No provision is made in S. 1620 to make the seeking or the acceptance of professional advice mandatory in dental matters. This, plus the power of the federal government to grant or to withhold subsidies, can result in the establishment of standards for education, practice and personnel which are contrary to the basic principles of the profession and which are essential to a proper quality of dental care.

S. 1620 also places in the hands of those not qualified the ultimate power to fix professional fees. There is no guarantee in the bill that such remuneration will be sufficient to make possible satisfactory dental service.

The third principle established by The House of Delegates of the American Dental Association, October 1938, is as follows:

The plan should be flexible, so as to be adaptable to local conditions.

S. 1620, through its power to grant or withhold subsidies, can force compliance with standards that do not recognize or satisfy the specific needs of a community with regard to methods of practice, treatment, administration and remuneration.

The fourth principle established by The House of Delegates of the American Dental Association, October 1938, is as follows:

There must be complete exclusion of non-professional profit-seeking agencies.

S. 1620 does not explicitly set up any such agencies at the present time. There is, however, also no guarantee that such agencies will not be developed in the future.

The fifth principle established by The House of Delegates of the American Dental Association, October 1938, is as follows:

The dental phase of a national health program should be approached on a basis of prevention of dental disease.

S. 1620 does not contain any assurance that this logical approach to the problem will be employed. Under the terms of the bill, it is possible to approach the problem on the basis of providing complete reparative and restorative dentistry for the entire population. Such a program involves high expenditures and is scientifically and economically unsound because it does nothing to diminish the future burden of dental disease or to lessen the future burden of paying for dental care. Such a program is only a stop-gap measure and one that would have little permanent or constructive effect on the national dental health. The Association will have a recommendation to make in regard to this very important part of the bill.

The sixth principle established by The House of Delegates of the American Dental Association, October 1938, is as follows:

The plan should provide for an extensive program of dental health education for the control of dental disease.

S. 1620 does provide for public health programs for the eradication of specific diseases, such as malaria and tuberculosis, pneumonia and cancer, but it does not include provisions for a similar program against the most prevalent of all diseases, dental caries. The bill makes it possible for administering agencies to refrain from instituting such a program of education, a program which is essential to the success of the dental program. The American Dental Association is of the opinion that a sound national health program must include dentistry and that a national dental program must rest fundamentally and finally on a plan for widespread dental education in conjunction with other preventive efforts and the early discovery of the cause of dental caries.

The seventh principle established by The House of Delegates of the American Dental Association, October 1938, is as follows:

The plan should include provisions for rendering the highest quality of dental service to those of the population whose economic status, in the opinion of their local authorities, will not permit them to provide such service for themselves, to the extent of prenatal care, the detection and correction of dental defects in children, and such other service as is necessary to health and the rehabilitation of both children and adults.

S. 1620 does not include these provisions. The bill does, however, make possible a complete system of tax-supported dental care for all groups of the population (which is contrary to the above principle), for which it does not provide sufficient appropriations.

The eighth principle established by The House of Delegates of the American Dental Association, October 1938, is as follows:

For the protection of the public, the plan shall provide that the dental profession shall assume responsibility for determining the quality and method of any service to be rendered.

S. 1620 does not safeguard this principle, but allows the quality of dental service to be determined and influenced by various agencies which are not under professional supervision or control.

From all of this, it can be seen that the American Dental Association is of the opinion that S. 1620 does not recognize the principles which the Association insists are fundamental to an effective national health program, but includes principles that the Association has declared are detrimental to the welfare of the public and of the profession.

The American Dental Association, therefore, reiterates its opposition to S. 1620 in its present form, because

I. It will allow for the creation of a system of compulsory health insurance, a form of practice that has been unconditionally opposed by the American Dental Association.

II. It is vague and obscure in its wording regarding methods of procedure and assignments of authority.

III. Its provisions will not permit the full development of a national health program because it fails to recognize that dentistry is an integral service necessary to the improvement of the public health.

IV. It does not recognize the importance of preventive dentistry as the basis of a national dental program, which has been consistently recommended by the American Dental Association.

V. It makes possible methods of practice that would be detrimental to the dental health of the public and to the continued progress of the profession and does not specify important mechanisms by which the quality of the health services rendered to the public could be controlled.

VI. It makes possible an unscientific and uneconomic expenditure of tax moneys for a program that the American Dental Association believes will not achieve its objectives.

VII. It places under federal control and supervision methods of practice, treatment, administration and remuneration which should be determined by, and acceptable to, local communities.

VIII. It does not recognize the essential differences between dentistry and the other health service professions.

IX. It has disregarded the fundamental principles proposed by the American Dental Association for the protection of the public and the profession.

X. It does not provide for the integration of all federal health activities in one agency.

The attitude of the American Dental Association, however, is not destructive of any proper effort to advance the interests of the national health. For this reason, it submits the following proposals by which a national health act can be made beneficial to the people of the nation.

PROPOSALS

1. All federal health activities, with the exception of the military services, should first be combined in one agency.

2. A national health bill should consider and make use of the principles established by the House of Delegates of the American Dental Association.

3. A separate title should be devoted to dentistry in any national health legislation in order to: (a) make provision for the essential differences between dentistry and other health services, and (b) augment with a comprehensive research program the efforts of the organized dental profession to determine the cause of dental diseases.

4. The following dental program should be carried on until the discovery of the cause of dental diseases enables a more informed attack on the problem:

(a) A program of preventive dentistry for children that would be based on the present knowledge of the subject, in order to decrease the future accumulation of dental disease. This would include a development of the educational program, initiated by the American Dental Association, to preserve the natural teeth and to teach both children and parents the importance of preventive dentistry during the prenatal, infant, preschool and school periods.

(b) A program of education for dentists to make available to them the latest advances in preventive dentistry as they are revealed through clinical experience and research.

(c) A program for providing "the highest quality of dental service to those of the population whose economic status, in the opinion of their local authorities, will not permit them to provide such care for themselves, to the extent of providing prenatal care, the detection and correction of dental defects in children, and such other services as are necessary to the health and rehabilitation of both children and adults."

SUMMARY

A. The American Dental Association has outlined the principles that should govern the participation of the dental profession in any national health program.

B. The American Dental Association has demonstrated that S. 1620 consistently ignores or violates these principles.

C. The American Dental Association has expressed the reasons for its opposition to S. 1620.

D. The American Dental Association has made proposals by which dentistry can participate in a national health program that will contribute to the health and welfare of the people of this nation.

C. WILLARD CAMALIER,
LEROY M. S. MINER,
ALFRED WALKER,
RAYMOND C. WALLS,
HAROLD W. OPPICE, *Chairman,*
National Health Program Committee,
American Dental Association.

PRACTICE IN PARAGRAPHS

This department is intended for busy readers. It aims to tell a vivid story in a few words. Items should be of a practical character, and free from padding—not more than a paragraph or two. We exact no limit, but two hundred words can tell most of these stories. Send in your ideas; they will be welcome.

What Are You Going to Do About It?—We were taught, then we practiced, and later taught, two cardinal principles in cavity preparation for amalgam fillings: (1) that the prepared cavity should be a combination of flat walls of dentin, coming together at angles the least bit acute, surrounded by an enamel line made up of the greatest curves permissible, and (2) that the last enamel rods at the cavosurface angle should be full length rods supported by shortened rods overlaid with the filling material. In both instances, the stated results are obtained by marginal beveling of greater or less width, resulting in a bevel angle of ever varying depth, to give a marginal bevel of equally varying width.

This, a conception of G. V. Black, was devised to give an enamel margin with the maximum resistance to crushing stress. The amalgam filling was so alloyed and compounded as to have slight shrinkage following the freeze. This slight shrinkage gives a slight tension between the internal anchorage and the flare of the marginal bevel, resulting in a tight marginal fit. This principle is applied in structural steel work in the use of red hot rivets which shrink upon cooling, close, even air-tight joints resulting. What if these rivets expanded on setting or cooling? Where would the riveted heads stand?

But here the expanding amalgam comes in. The internal anchorages hold. The expansion finds expression in lifting the marginal bevel clear of the tooth substance making up the bevel. Now comes the question: Will you abandon the marginal bevel, resulting in a weak cavosurface angle, or will you continue what is known as the G. V. Black cavity preparation and see the expanding amalgam fillings push their ruffled margins away from the bevels?

The last three years has seen more faulty amalgam fillings than did the twenty previous years, when we had the old reliable alloys and many other slightly shrinking alloys.

Some day, a manufacturer will have the judgment to give us some of the previous alloys. He will sell a great deal if he makes his reasons clear for so making the alloy and standing four square against the expansion theory.

Tests have been made of the various makes in steel dies with beveled margins, and in ninety days the foregoing questions again confront us, and are yet unanswered.—*W. Clyde Davis, Lincoln, Nebr.*

Refinishing Instruments—Rusty but still serviceable instruments of poor appearance can be refinished in a few minutes with aluminum paint (a bottle of which may be obtained at any 10-cent store). They are then spread out fanwise in a round pan and permitted to dry for about six hours before sterilization. Instruments so treated can be repeatedly sterilized. Although they may feel somewhat sticky after the first sterilization, they will thereafter have a hard

finish.—*Harry S. Hawkins, D.D.S., Newport, Ind.*

Scaling Calculus from Tooth Roots—In scaling very small deposits of calculus from gingival pockets that ordinarily escape detection, the following technic is suggested: The assistant blows a continuous stream of compressed air, under low pressure, from the air syringe attached to the unit, on the interdental papilla, the air stream separating the gum tissue from the tooth, exposing the entire pocket and allowing the operator to scale with the calculus visible to the eye. Continuing this procedure around the neck of the entire tooth assures complete removal of the very last vestiges of calculus.—*H. B. Binder, D.D.S., Troy, N. Y.*

Matrix Wedges—Three-sided wedges whittled from wood the size of stick matches are far superior as matrix wedges to the usual four-sided and round types. Cut in tapering form from three-eighths to one-half inch in length, the three-cornered wedge offers a flat side to the matrix band, a wedge corner to the adjacent tooth and an inclined plane toward the interproximal gum papilla. The last feature is especially important in children's dentistry, when it really moves the papilla to one side and thereby prevents injury and pain. Where this wedge can be inserted from the palatal side of upper posterior teeth, the abutting end tends to keep the exploring tongue off the field of operation. When separation is desired between anterior teeth, one or more pieces of steel matrix band material forced through the contact point aid in the insertion of a wedge at the gingiva. A coin under thumb pressure aids in forcing the wooden wedge to place.—*James A. Matthews, Glen Cove, N. Y.*

Drying Inlay Patterns—A convenient and excellent method of drying inlay patterns after the soap solution wash consists in drawing the wet camel's-hair brush between the fingers and thus expressing the greater part of the water, then applying the tip of the brush to the pattern, the water passing from the latter to the brush by capillary attraction. —*Leo C. Clark, Berkeley, Calif.*

Silver Nitrate Applicator—Discarded double-end explorers with the ends cut off at the desired points can be used as applicators for silver nitrate solution. The applicator is prepared in the following manner: The explorer end is heated slightly and touched to sticky wax, only a small amount of wax being allowed to gather on the explorer tip. Again warmed slightly, the explorer is applied to a small piece of loose cotton and twisted. After use, the cotton is readily removed by warming close to the end. The opposite end is used for the reducing agent. This provides a safe method for using silver nitrate in the mouth in difficult areas without danger to the patient or inconvenience to the operator.—*Leo C. Clark, Berkeley, Calif.*

Trismus and Cellulitis—Trismus or cellulitis in the soft tissues overlying an unerupted or partially erupted lower third molar, where extraction of the molar is indicated, may be relieved at once by reversing the usual surgical procedure and removing the unaffected upper third molar. With the bite thus relieved, comfortable mastication is immediately restored and the painfully sore soft tissues will return to normal at once. The lower molar can be removed at leisure.—*L. M. Lucas, 900 Seventeenth St., N.W., Washington, D. C.*

CURRENT LITERATURE

Blennorrhagic Balanitiform Keratoderma: Report of Three Cases, Including One of Buccal Involvement

By W. L. Sherman, F. Blumenthal and J. Heidenreich

Blennorrhagic balanitiform keratoderma is usually indicative of a systemic gonorrheal infection. It is characterized by the appearance of sores on the glans penis. These areas become subjected to leukokeratotic changes and pigmentation results. One of the three cases discussed, oddly enough, showed palatal involvement. The buccal mucous membrane in the region of the hard palate showed two irregularly shaped areas with shallow grayish red centers and erythematous borders. No tenderness was present. Microscopic examination revealed leukokeratotic changes.—*Arch. Derm. & Syph.*, 39: 422, 1939.

J. Volker.

Radiologic Treatment of Actinomycosis

By A. Renander

The author reports the treatment of fifty-two microscopically proven cases of actinomycosis with radium. Early diagnosis, although difficult in many cases, is of great importance and the modern tendency is toward high doses of radiation in proven cases. The author feels that the use of potassium iodide and surgery are less important than radiotherapy in treatment. His results, like those of many others, were good in the cervicofacial, fair in the abdominal and generally poor in other cases.—*Acta Radiol.*, Supp. 35, 1937, pp. 1-75; abstr. *Am. J. Roentgenol. & Rad. Ther.*, 41:467, 1939.

F. Allen.

A Sign of Facial Palsy

By R. Wartenburg

The author discusses the difficulty of recognizing the earliest manifestations of facial palsy and determining when the condition has been completely cured. He diagnoses facial palsy by exerting an upward pressure on the upper lid of the eye with the finger, a decrease in vibration of the lid as the patient closes the eye being taken as a reliable sign of facial palsy.—*Arch. Neurol. & Psychiat.*, 41:586, 1939.

J. Volker.

Mixed Tumors of the Sublingual Gland

By M. K. Smith

Mixed tumors of the sublingual gland are very rare. The recent literature reported only 0.8 per cent of these tumors among all salivary gland tumors listed. The case of a woman having a mixed submaxillary gland tumor which has been treated for the past seventeen years is reported by the author. Of interest in this case is the absence of demonstrable lymph node involvement, the long duration of the disease and the restriction of the local growth since the beginning of radiotherapy six years ago. Extensive pulmonary metastases were revealed by radiography.—*Ann. Surg.*, 109:551-554, 1939.

F. Allen.

Combined Roentgenoneurosurgical Treatment of Salivary Fistulas of the Parotid Gland

By N. N. Sokoloff

Single or multiple salivary fistulas may develop after a trauma or may follow inflammatory and necrotic processes in the region of the parotid gland. An excision of such fistulas adherent to the surrounding tissues is useless. Mobilization of the fistulous tract with implantation in the oral cavity is frequently impossible on account of the scar tissue; and occlusion or excision of the fistula would require extirpation of the parotid gland, with a resulting paralysis of the facial nerve.

For these reasons, Leriche suggested neurotomy of the auriculotemporal nerve for severance of the secondary fibers, checking of the secretion and healing of the fistula. Kaess obtained similar results by irradi-

ating the parotid gland with the x-rays. Leriche's operation does not always stop functioning of the gland because the usual approach to the above-mentioned nerve through the anterior vertical incision in front of the ear does not allow destruction of the secretory fibers, particularly if they originate not in the temporal branches, but in the common trunk of the nerve, close to the median meningeal artery. Such location can be reached only after resection of the articular process of the lower jaw, which of course does not come into consideration. Kaess' method does not have permanent results and does not prevent a recurrence. Injection of alcohol into the third branch of the trigeminal nerve has not always had good results and is known to cause anesthesia of the involved region.

In view of these considerations, the author combined x-ray therapy with Leriche's denervation in two cases. Three irradiations were given before the operation, the total dose being 700 roentgens. A vertical incision 5 cm. long extended from the lower border of the zygomatic arch upward, 0.5 cm. from the anterior border of the external auditory canal. The temporal artery and the nerve behind it were exposed and exeresis of the latter was performed by twisting it around a hemostat behind the articular process of the lower jaw. The operation was performed with the patient's mouth open to increase the space between the articular process and the auditory canal. This technic allows destruction of the majority of the secretory fibers in the auriculotemporal nerve.

The patients were kept under observation for two years and, during that time, no recurrences were observed.—*Vestnik khir.*, **55**:243, 1938; abstr. *Surg. Gynec. & Obst.*, **68**:142, February 1939.

Cancer in India

By V. Nath and K. Grewal

Buccal cancer is prominent in all the necropsy and histologic records obtained by these investigators. Carcinoma of the mouth ranks second in frequency of occurrence among these peoples. Regional distribution, according to sex, indicates that buccal cancer shows a higher incidence among the males (23 per cent) as compared with the females (8 per cent) of India.

The sites affected, in order of frequency, are: buccal, 24.3 per cent; gastrointestinal, 19.8 per cent; female genital tract, 14.2 per cent; breast, 9.9 per cent; penis, 5.7 per cent, and skin, 4.6 per cent. Several thousand case records were studied in obtaining these statistics.—*Indust. J. M. Res.*, **26**:785-832, 1939.

F. Allen.

Bacteriology and Immunology of Chronic Staphylococcal Osteomyelitis

By K. E. Hite

Frequently, in a chronic osteomyelitis lesion, clinical improvement is difficult to attain through the use of staphylococcus products. The author investigated the possibility of the inflammatory tissue in the sinus tract of such lesions acting as barriers to the exchange of products between the blood stream and the interior of the sinus.

Staphylococcus toxin, botulinus antitoxin and horse plasma were found not to be destroyed by *in vitro* incubation for from sixteen to twenty hours with pus and emulsions of chronically inflamed tract lining. Therefore, the deterrent action of inflammatory tissue upon interchange between the blood and osteomyelitic lesions is doubtful. No other explanation is offered in solution of the problem.—*J. Infect. Dis.*, **64**:93-96, 1939.

F. Allen.

Diet: A Predisposing Factor in the Aetiology of Vincent's Infection and Periodontitis

By R. M. Kirkpatrick

In a study of diets of the natives of Australia and New Guinea, the author noted that deficiencies of vitamins A and B_2 were partially responsible for the predisposition of the natives to Vincent's infection and suppurative periodontitis.—*D. J. Australia*, **11**: 1, January 1939.

B. J. Frey.

Malignant Tumors of the Salivary Glands

By W. F. MacFee

Twenty-seven cases of salivary gland tumors are reviewed, with the following summary: Malignant tumors of the salivary glands, in the great majority of cases, are epithelial in origin and are classified as car-

cinomata. Their origin is probably in displaced embryonal cells of the salivary glands, or, more likely, in the buccal epiblast with some underlying mesoblast. They exhibit a wide variety of histologic structure and clinical behavior. They affect the sexes in nearly equal numbers and may occur at almost any age. Some apparently arise as malignant tumors, while others appear to be the result of malignant changes in primary benign tumors. Metastasis to the regional lymph nodes is relatively infrequent (15 per cent in twenty-seven cases reviewed). The treatment which appears to give the best results is surgical extirpation combined with radiotherapy. Prognosis in a given case cannot be made with certainty.—*Ann. Surg.*, **109**:534-550, 1939.

F. ALLEN.

Sublingual Epidermoid Cysts

By B. R. SHORE

THE author reports four cases of true epidermoid cyst arising in the floor of the mouth. Each of the cysts was lined with stratified squamous epithelium. Two contained hairs or hair follicles. Preoperative and postoperative illustrations of one of these cases are presented with a photograph and a photomicrograph of the specimen. The author discusses the origin of these cysts from fetal remnants in the mesobranchial field and differentiates them from ranulae. He advocates surgical excision as the treatment of choice.—*Ann. Surg.*, **108**:305, 1938; abstr. *Surg. Gynec. & Obst.*, **68**:237, March 1939.

Anesthesia Death

A BOY about 17 years of age had had a tooth extracted, after which his jaw became swollen and he developed cellulitis with a lingual abscess. An oral surgeon was consulted and advised an operation for the purpose of treating the condition. The oral surgeon, after consultation with another specialist in his field, decided that the anesthetic should be evipal, and a physician who had for many years specialized in anesthesia was called in to administer the anesthetic. The physician, as a preliminary to the operation, examined the patient and found his heart, pulse, respiration, blood pressure and lungs normal from an anesthesia standpoint. There was no respiratory involvement whatsoever and the air passages were clear. The anesthetist computed the dosage of evipal to be administered as 8.64 cc. The patient was placed in a dorsal position and the solution of evipal was carefully injected into a vein in the bend of the elbow. When the patient appeared to be completely anesthetized, the oral surgeon proceeded with the operation, which took from five to ten minutes. However, upon the completion of the procedure, the patient's breathing stopped, and although emergency measures were introduced, he was declared dead within a half-hour.

A malpractice action was instituted against both the oral surgeon and the anesthetist in which the plaintiff's contention was that evipal should never have been used, that it was contraindicated, that it was in an experimental stage and that other and safer anesthetics could have been used in the case.

The case came on for trial before the court and a jury and there was a direct conflict of testimony as to the propriety of using evipal. The issues were submitted to the jury and a verdict was returned in favor of the defendants, thereby exonerating them of the charge of malpractice.—*New York J. Med.*, **39**:955, May 1, 1939.

Ludwig's Angina

By M. GRODINSKY

AN excellent review of the literature on the subject is presented and the pathologic anatomy and clinical findings are thoroughly discussed. The author summarized four cases that he had treated. He contends that the lower molar and bicuspid teeth are the usual foci. Scratches or wounds in the mucous membrane of the mouth may also be a portal of entry for infectious material. The streptococci and staphylococci are the most common bacteria found in the infected area, but Vincent's organisms and the other spirochetal inhabitants of the mouth may be primary or secondary invaders. Treatment consists of adequate and proper surgical drainage, instituted as soon as the diagnosis is made.—*Surgery*, **5**:678, 1939.

J. VOLKER.

Melanocarcinoma of the Hard Palate

By I. A. ARONS

MELANOCARCINOMA of the hard palate is an extremely rare disease. In the case described

by the author, the initial lesion occurred on the hard palate, with a supplementary growth on the gum tissue over the left incisor region. The neoplasm was treated with a combination of x-ray and radium needles. These needles were held in position by a dental mold and the tongue was protected by sheet lead. Although the primary lesion responded to treatment, metastases to the liver and spine resulted in death five months after diagnosis of the lesion.—*Laryngoscope*, 49:271, 1939.

J. VOLKER.

Utilization of the Calcium of Milk by Preschool Children

By G. KINSMAN, D. SHELDON, E. JENSEN, M. BERNDS, J. OUTHOUSE and H. MITCHELL

MILK has long been recognized as the most important source of dietary calcium. However, the extent to which milk calcium is available for growth and the physiologic processes of man has not received adequate attention. Studies were made on the utilization of milk calcium by five preschool girls and six preschool boys. It was found that 19 per cent of the milk calcium was utilized by the girls and 20 per cent by the boys. These results demonstrated that only one-fifth of milk calcium is utilized when it is included in an adequate diet.—*J. Nutrition*, 17:429, 1939.

J. VOLKER.

Structure of the Teeth in a Late Case of Osteogenesis Imperfecta

By M. A. RUSHTON

TEETH extracted from a woman aged 30 who had suffered from late osteogenesis imperfecta were studied. They were small, with pinkish crowns and short translucent roots. Although the growth of the whole dentinal papilla was reduced, the odontoblastic differentiation was normal. Normal matrix and Tomes' fibers were produced at the periphery of the teeth, but soon the odontoblasts and other cells concerned ceased to form Tomes' fibers and matrix. This change occurred first where the odontoblasts were oldest, but in a piecemeal manner. Blood vessels were included in the matrix. Pulp stones occurred in the middle of the dentinal papillae. At a later stage, when no normal Tomes fibers were being formed, a tissue resembling primitive fiber bone replaced the former cavity.—*J. Path. & Bact.*, 48:591, 1939.

FRANK ALLEN.

Carcinoma of the Lip

By E. T. NEWELL

THREE hundred and ninety cases of carcinoma of the lip are presented. Of these, 344 were of the squamous cell type, forty-four basal cell and two adenocarcinoma. There were 336 malignant lesions of the lower lip and fifty-four malignant lesions of the upper lip. The author emphasizes the fact that, clinically, a lesion cannot always be diagnosed as benign or malignant. Emphasis is placed on microscopic study in relation to prognosis and therapy. Five year follow-ups in 328 of the 390 cases treated showed a clinical cure in 61.6 per cent. Of the total number of cases, 143 presented metastasis.—*Arch. Surg.*, 38:1014, 1939.

FRANK ALLEN.

Effect of Thyroxine on Eruption of Teeth in Newborn Rats

By D. KARNOFSKY and E. P. CRONKITE

DAILY subcutaneous injections of 100 gammas of thyroxine caused the incisors of rats to erupt on the third day instead of the eighth (normal). Single doses at birth caused the eruption rate to increase in proportion to the dose. However, thyrotrophic hormone could not be standardized in this way.—*Proc. Soc. Exper. Biol. & Med.*, 40:568, 1939.

H. C. HODGE.

Epulis: A Series of Cases

By B. G. ANDERSON

IN a group of twenty cases, ten of the patients stated that the growth started with a local mechanical injury (chiefly from broken-down, carious teeth). Of the other ten, none was certain as to the beginning of the tumor. Follow-ups for varying periods after the removal of the tumors (local anesthesia) have revealed no recurrence. Teeth displaced by the tumors were removed only when the displacement was of such a degree that return to the normal line of occlusion was felt to be impossible.—*Arch. Surg.*, 38:1030, 1939.

FRANK ALLEN.

Fluorosis in Rats Due to Contamination with Fluorine of Commercial Casein. Effects of Darkness and of Controlled Radiation upon Pathology of the Teeth

By H. C. Hodge, E. M. Luce-Clausen and E. F. Brown

Rats were maintained for three generations in (a) darkness, (b) infra-red radiation and (c) visible light. Certain rats received a ration containing commercial casein which was contaminated with fluorine. In the resulting fluorosis, the upper incisors lengthened and the lower incisors fractured. The eruption rate of both upper and lower incisors decreased. Color measurements of the incisors showed marked diminution in color, as compared with the normal. The measurements of length and color gave some evidence that the presence of fluorine in the diet intensified the effect of lack of radiation in the affected animals; e.g., the incisors of fluoride poisoned rats kept in darkness were very faintly pigmented, while the incisors of normal rats had normal pigmentation even in darkness.—*J. Nutrition*, 17:333, 1939.

H. C. Hodge.

Relation of Vitamin D and Mineral Deficiencies to Dental Caries

By G. F. Taylor and C. D. Marshall Day

In a public health department survey of the children of the Kangra District, Punjab, India, who live under primitive conditions, a very low incidence of dental caries and dental hypoplasia was noted in association with a prevalence of rickets, osteomalacia and definite deficiencies of vitamin D, calcium and phosphorus. Examination of fifty rachitic children confirmed these findings. Further confirmation was obtained by x-ray examination of ten of these children (case histories reported). Of the ten cases, four showed no caries, and the average incidence of caries was one and four-tenths cavities per child. Macroscopic hypoplasia was present in three cases. Both teeth and jaws were well formed. In the group of fifty patients, two showed severe hypoplasia and dental caries. Both had histories of prolonged and repeated infection since birth. Comparisons are made with a group of 800 "middle class" Indian children in Lahore eating a europeanized diet and showing an average of six cavities, and an orphanage group of twenty-six poor Indian children on a "low" diet showing an average of two and two-tenths cavities.

It is concluded that vitamin D deficiency alone does not cause either dental caries or hypoplasia of the teeth and that deficiencies of calcium and phosphorus and high contents of anticalcifying cereals do not lead to a greater susceptibility to dental caries. The physical nature and cleansing action of the food is thought to be more important than other factors in the prevention of dental caries.—*Brit. M. J.*, 1:919, May 6, 1939.

Basil G. Bibby.

Adamantinoma of the Superior Maxilla with Intracranial Extension

By S. Androp

Adamantinomas are considered to be derived from embryonic enamel organs of the teeth. Although these tumors are usually small, those arising in the maxilla are quite prone to invade the maxillary sinus. Since this tumor was rapidly growing, invasion of the antrum was early and the adjacent dura mater was subsequently encroached upon. Thrombosis of the lateral venous sinus occurred; causing hemorrhagic infarction of the temporal lobe and slight subarachnoid hemorrhage, with fatal termination.—*Laryngoscope*, 49:119, 1939.

Virgil D. Cheyne.

Effect of Saliva on Blood Coagulation

By J. F. Volker

This investigation was stimulated by the interest of oral surgeons in the factors in the clotting of blood in the oral cavity. The author's findings substantiated the reports of earlier investigators that blood coagulation is hastened by the action of the saliva. Coagulation is brought about by neutralization of the anticoagulants in the blood. Watery solutions of salivary proteins exhibited activity similar to that of whole saliva. Since simple dilution of blood resulted in diminishing of the clotting time, it is suggested that dilution of the antithrombin is responsible for at least a portion of the reduction in coagulation time.—*Am. J. Orthodon. & Oral. Surg.*, 25:277, 1939.

Virgil D. Cheyne.

Submicroscopic Structure of Dental Enamel

By J. Thewlis

In a submicroscopic study of the structure of deciduous enamel conducted by x-ray diffraction methods, it was found that the multitude of apatite crystallites, of which enamel is largely composed, are so arranged within the individual enamel prism that their hexagonal axes make angles of 5 and 40 degrees with the long axis of the prism. The proportion of both types of directional crystallites may vary among prisms, but, in most cases, the 5 degree prism predominates. The crystallites are so inclined that they point to the side of the prism remote from the nearest cusp, and away from the tooth. The arrangement of the crystallites in the interprismatic substance appears to be the same as that of the prisms, although not necessarily in the same proportion.—*Proc. Roy. Soc. London*, 127:211, 1939.

S. Finn.

Viability and Maintenance of Oral Strains of Lactobacillus Acidophilus

By H. R. Sullivan

Twelve oral strains of *L. acidophilus* were subcultured in (a) nutrient broth, (b) milk covered by a seal of liquid paraffin and (c) cooked meat medium covered by a seal of liquid paraffin. After incubation for six hours at 37° C., the cultures were stored at 8, 22 and 37° C. for nine months. Subcultures were made at weekly intervals for three months, and thereafter monthly to 6 months and again at 9 months. The biochemical reactions of all variable strains were retested at the end of six months.

The cooked meat medium was the most satisfactory of the media tested. Only minor changes in morphologic and colonial characteristics were detected after 9 months. Storage temperature did not seem to be of much importance, but general considerations indicated that refrigerator temperature is preferable.—*J. Path. & Bact.*, 48:607, 1939.

M. Van Kesteren.

Teeth from a Case of Hypoparathyroidism

By H. F. Humphreys

Supporting findings made by Schour and his co-workers of this country (1937) on experimental animals, the author discovered changes in the dentin due to hypothyroidism in a woman aged 23, who first showed clinical symptoms of the disorder at the age of 12. During the intervening years, she had had several tetanic convulsions with characteristic low serum calcium. Sections of the teeth showed some hypoplasia of the enamel dating from before the age of 6 years, but no evidence of disturbance in the calcification of dentin before the ninth year. Changes in the dentin after 12 years were particularly evident. The dentin was markedly hypoplastic and the blood vessels of the pulp were surrounded by calcified tissue.

These tooth changes can be attributed to a disturbance in the normal process of calcification, rather than to a specific disease entity, the forming dentin acting as a sensitive register of biochemical change.—*Proc. Roy. Soc. Med.*, 82:633, 1939.

Virgil D. Cheyne.

Some Properties of Egg-White Lysozyme

By E. P. Abraham

Lysozyme was prepared from egg white according to the method of Roberts. An analysis was made of the constituent amino-acids, and electrometric titrations were carried out to determine its solubility. Amino-acids were present in the following proportions: arginine, 11.6 per cent, cystine, 7.0 per cent; lysine, 5.8 per cent; tyrosine, 4.4 per cent, and histidine, 2.6 per cent. Although the material was apparently homogeneous in the ultracentrifuge, the presence of two nonidentical active proteins was demonstrated. A certain amount of this had a much lower solubility, a lower activity and a somewhat larger acid and base binding capacity than the rest. No material was present of a molecular weight higher than 18,000. Electrometric titration of the soluble lysozyme showed that this was a basic protein with an acid-binding capacity not far from twenty-three groups per molecule. At pH 11.5, the basebinding in water, at 25° C., corresponded to about fifteen groups per molecule. The acid and base binding capacities of the insoluble fraction were somewhat larger.—*Biochem. J.*, 33:622, 1939.

M. Van Kesteren.

BIBLIOGRAPHICAL

Health Insurance with Medical Care.

By Douglass W. Orr, M.D., and Jean Walker Orr. New York: The Macmillan Co., 1938. Price $2.50.

The foreword of this book was written by David Lloyd George and is of particular interest when one learns that it was he who introduced health insurance and medical care in England more than thirty years ago in the face of tremendous opposition. He says, "The nation would as soon think of abandoning it as it would of abolishing the Post Office."

The introduction written by Helen Hall is a clear-cut statement of the reasons that the low level income groups require medical service via the insurance method and the far-reaching effects upon these groups when such services are beyond their reach.

This most interesting book was written by an American physician and his wife, an experienced social worker. It deals with first hand investigations and personal interviews with insured workers and their medical advisors in England. The methods used by the author, going directly to recipients of the benefits of health insurance and medical care for their data, gives a very clear understanding of the problem. The authors feel that the methods used in England are worthy of study in view of the major problem now facing the medical profession in the United States. They state: "We in the United States will in the last analysis work out our own solutions in our own way. The example of Great Britain, if we will let it, can, however, contribute to our understanding both of principles and of methods. National Health Insurance is one of her great social services. Seen for what it is, studied in its setting among the other medical and health services of the nation, and viewed in the light of probable next steps and future developments, it may well help us to provide a greater measure of social security for those many American families to whom sickness comes, not as a mere inconvenience, but as a major catastrophe."

Manual for Dental Technicians. Vulcanite.

By J. A. Salzmann, D.D.S., chairman, Committee on Courses for Dental Technicians and Head of Dental Service, New York City Vocational Schools; editor, New York Journal of Dentistry; author of "Principles and Practice of Public Health Dentistry." Cloth. Price $4.00. 346 pages with 286 illustrations. New York: Pitman Publishing Corp., 1939.

This manual is intended for the use of high school students who are taking the vocational courses in dental technics offered in New York City. The volume is a thorough and detailed descriptive consideration of the laboratory procedures involved in full and partial denture construction. A consideration of the materials, cast development, artificial teeth, packing and finishing of vulcanite dentures and the repair and rebasing of these dentures is adequately covered in outline form. The manual is arranged for each project with great thoroughness and attention to detail and should prove very useful in teaching the particular type student for which it is intended.

The Technic of Stainless Steel in Mechanical Dentistry.

By G. H. Siddle. Cloth, Price 5/. 88 pages, with 33 illustrations. London: Henry Kimpton, 1939.

This small English publication covers the technic and equipment involved in the processing of swaged full and partial dentures constructed of stainless steel. The construction of these bases by the swaging method entails the use of a somewhat cumbersome apparatus. In addition, the number of steps involved in the construction, as the making of dies, counter dies, welding and soldering

make this type of work a lengthy procedure. Since the development of the casting technic for chrome alloy steels, it seems evident that the use of swaging will be largely discarded, as more accurately fitting metal denture bases can be made with a shorter and easier technic.

The Principles of Dental Medicine

By F. W. Broderick, M.R.C.S. (Eng.), L.R.C.P. (Lond.), L.D.S. (Eng.), Hon. Dental Physician to the Royal Victoria and West Hants Hospital; Hon. Dental Surgeon to the National Sanitorium for Diseases of the Chest, Bournemouth; Cartwright Prizeman, Royal College of Surgeons, England, 1926-1931. Third Edition. Cloth. 575 pages. St. Louis: The C. V. Mosby Co., 1939. Price $7.50.

This book discusses certain aspects of dental disease in relation to general physiology, but in a rather unsatisfactory manner. The abstruseness of the text makes the book quite difficult to read and even more difficult to interpret. The author presents a thoroughly unorthodox point of view regarding the physiologic processes of the body. Many quotations from the works of other investigators are presented in an attempt to elucidate the author's concept of dental disease, which is, essentially, that dental caries and pyorrhea alveolaris are reflections of a maladjustment of the acid-base balance of the blood which may be reflected in the saliva.

To quote (p. 301): "I have said that increased thyro-adrenal activity tends to increase blood pressure, and a deficiency, to lower this; one would, therefore, expect to find the former in persons with sympathetic excess, acidosis and dehydrated colloids, and the latter in those with parasympathetic excess, alkalosis and hydrated colloids; the former to accompany dental caries, the latter pyorrhea. But there are a number of factors which tend to upset this simple reasoning. The underlying cause of a rise in blood pressure is a contraction of the small blood vessels and the capillaries, and of a fall, a dilatation of these; we see, therefore, how the circulating hydrated colloid particles lower blood pressure in that they dilate vessels, and dehydration of the colloid raises this; but any circumstances which will bring about a contraction of the capillaries over a considerable area, such as a sclerotic kidney, will produce high blood pressure even though at the time of estimation the colloids tend to be hydrated."

Included in the text are a number of case histories and charts of the laboratory findings on a group of patients which the author hopes will be quite clear; but their content is anything but clear. As a matter of fact, the reviewer is still very much in the dark as to Broderick's methods of diagnosis and the rationale of treatment.

F. K.

Oh, Doctor! My Feet!

By Dudley J. Morton, M.D., Associate Professor of Anatomy, College of Physicians and Surgeons, Columbia University. Cloth. 116 pages. New York: D. Appleton-Century Co., 1939. Price $1.50.

This interesting little book designed for lay consumption tells the story of proper foot hygiene and care in an interesting narrative form. In the course of treating hypothetical Mrs. Roberts' sore feet, hypothetical Dr. Nelson has an opportunity to discuss the anatomy and physiology of the foot and the proper fitting of pedal accessories. Useful information is contained in the small volume for those who like Mrs. Roberts suffer with their pedal extremities. The many suggestions offered to dentists will, if followed, go far toward relieving the stress on the feet of those who stand while operating.

Complete Denture Prosthesis

By Rudolph O. Schlosser, D.D.S., F.A.C.D., Professor of Prosthetic Dentistry, Northwestern University Dental School. 583 illustrations. 285 figures. Philadelphia and London: W. B. Saunders Co., 1939. Price $5.

"The purpose of this book is to furnish the student, undergraduate, graduate or postgraduate, with a guide to a better understanding of the fundamental principles involved in complete denture prosthesis and the means to a solution of these problems. It is a comprehensive presentation of the clinical and laboratory procedures necessary to render a service in accord with the highest professional standards."

This text is well written, in clear and concise English. The subject is presented by emphasizing, first, the objectives of complete denture prosthesis; secondly, the basic sciences to which denture prosthesis is related, and, thirdly, the detailed technical procedures employed in full denture construction. There are chapters devoted to maintenance and correction of dentures, immediate denture prosthesis, construction of single complete dentures and complete denture prosthesis for anomalies of the jaw and of relation. While the text describes primarily the technic taught by the author, there are many references to the literature that should be of real value to the interested reader.

The author's former students have been eagerly awaiting the publication of this text for the past decade. It will serve them as a guide in their professional work. The book is not designed as a text for all undergraduate students. The greater portion deals primarily with the author's clinical and laboratory procedure. The detailed procedures of other authorities are referred to in many instances through references included in the text. In those institutions where the detailed clinical procedure varies widely from that described, Dr. Schlosser's contribution will serve as a welcome addition to the available references in this field. The author is to be commended for the effort that has resulted in this addition to dental literature.

The Newer Knowledge of Nutrition

By E. V. McCollum, Ph.D., Sc.D., LL.D., Professor of Biochemistry, School of Hygiene and Public Health, The John Hopkins University; Elsa Orent-Keiles, Sc.D., Associate in Biochemistry, School of Hygiene and Public Health, The Johns Hopkins University, and Harry G. Day, Sc.D., Associate in Biochemistry, School of Hygiene and Public Health, The Johns Hopkins University. Fifth Edition, rewritten. Cloth. 701 pages. Price $4.50. New York: The Macmillan Co., 1939.

This new revision of a familiar work is the first to appear since 1929. In the ten-year period from 1929 to the present, tremendous strides have been made in the field of pure and applied nutrition. This volume undertakes to bring the material up to date and accomplishes the task in a highly satisfactory manner. It begins with a short chapter on the history and development of the science of nutrition, which is followed by successive chapters on the nutritive requirements of the body. The various foodstuffs are considered separately; as proteins, fats, carbohydrates. The alkaline earth salts, "trace" inorganic elements including a brief but meaty summary of the work on fluorine and its relation to mottled enamel, and the various vitamins are discussed, both from the standpoint of their chemical properties and from their requirements. The volume closes with several chapters on applied nutrition. Each of these sections is written in an interesting, completely factual manner. A brief history of the foodstuffs under discussion opens the chapter, followed by an elaboration of the recent work and the present status of the subject. There is a well written chapter on diet in relation to the teeth, which briefly but fully covers the present status of dental caries and the influence of foodstuffs on the development of decay. An appendix at the end of the book contains information on the nutritive and vitamin content of certain foodstuffs. A few illustrations exhibiting the microscopic and gross effects of various deficiencies is included. It is difficult to see how this book could be improved over its present form. It is heartily recommended to those requiring or desiring information concerning the most recent work in nutrition, and its low price should make it a "best seller" in the field of nutrition.

An Introductory Guide to Biochemistry

By Sidney Bliss, Ph.D., Professor of Biochemistry, Tulane University School of Medicine. Cloth. 103 pages. Price $1.25. Philadelphia: W. B. Saunders Co., 1939.

This little volume has been written with the intention of giving the prospective biochemistry student a bird's-eye view of the course and, in addition, of providing him with a brief summary of the field to be covered by the larger works in biochemistry. Elimination of all chemical formulas as well as controversial material makes the text as simple to read and understand as is possible. This apparently has been done in the belief that many prospective students of biochemistry approach it with dread and with a feeling of inferiority. As is explained in the

preface, the author hopes that his little work will give the student sufficient confidence in himself to realize that the curricular bogeyman, biochemistry, should not be frightening after all. To those students facing their courses with such hesitation, this volume may prove useful. It is pleasantly and briefly written and may easily be read in a vacation period by even the most unindustrious student.

Dental Disease; Its Chemical Causation and Cure

By R. G. Torrens, B.A., B.D.Sc., T.C.D., Honorary Dental Surgeon to the Royal Victoria and West Hants Hospital, Bournemouth. Cloth. 254 pages. Price 10/6 net. London: Henry Kimpton, 1938.

This volume, written by a colleague of Broderick, attempts to amplify as well as simplify the tenets expressed by Broderick regarding dental disease. The book is divided into three portions. The first deals with the structure of matter and elementary atomic physics; the second attempts to apply the foregoing information to dental diagnosis, and the final portion deals with the action of certain drugs used by the author in the treatment of various dental complaints. The philosophy behind this work is, briefly, that all disease, including dental disease, is a manifestation of "electrionic" upsets resulting in hydration or dehydration of the colloids of the body, and is associated with either sympathetic excess or deficiency, or parasympathetic excess or deficiency. After reading this book, one is impressed with the fact that the author has saddled himself with a tremendous burden in order to prove a fantastic concept. There is no experimental evidence cited to indicate that the hypothesis presented has any foundation in fact.

Personal and Community Health

By C. E. Turner, A.M., Sc.D., Dr. P. H., Professor of Biology and Public Health in the Massachusetts Institute of Technology. Fifth edition. Cloth. 652 pages. Price $3. St. Louis: The C. V. Mosby Co., 1939.

This volume is divided into two portions. The first deals with the elementary aspects of personal health, and, in this section, brief discussions of nutrition, digestion, oral hygiene, respiration, etc., are presented. Some attention is paid to elementary biology, physiology and anatomy in the elaboration of this portion of the text. The second section of the book is concerned with community health, and here one finds brief but competent discussion of the methods of disease transmission, the essential facts of immunity and resistance and the methods of disease control; i.e., food control, waste disposal, water supply, quarantine, ventilation, heating and lighting and the essential details of public health administration. There is a rather complete appendix to the book giving briefly in outline form the essential factors in a number of communicable diseases, which should be of great value as a reference. This book was obviously written for students in colleges or universities taking the customary course in hygiene. It seems to be admirably adapted to this purpose, providing a clear, brief text covering all the important factors in personal and public health. The section on community hygiene provided in this book may prove of value to those teaching short courses in public health in professional schools where a brief text is desired. The first portion of the book is too elementary to be of much value to these students, however. The book is well printed, with easily read type on nonglare paper, and, in general, presents an excellent elementary discussion of individual and community hygiene.

The Toothbrush: Its Use and Abuse

A Treatise on Preventive Dentistry and Periodontia as Related to Dental Hygiene. By Isador Hirschfeld, D.D.S., F.A.A.P., Associate Professor of Dentistry, Department of Periodontia, School of Dental and Oral Surgery, Columbia University; Attending Dental Surgeon, Presbyterian Hospital, Columbia University Medical Center; Consulting Periodontist, Beth Israel Hospital, New York; formerly chief, Periodontia Clinics, Midtown Hospital and Hospital for Joint Diseases, New York; formerly Attending Periodontist, Bellevue and Allied Hospitals of Greater New York. With 174 case histories and 415 illustrations. Dental Items of Interest Publishing Co., Inc., Brooklyn, N. Y., 1939. Price $7.50.

Dr. Hirschfeld, in presenting a textbook on

the toothbrush; its use and abuse, has written a treatise on preventive dentistry and periodontia as related to dental hygiene. His careful observation and long experience in practice, in teaching and in hospital associations, have given him an opportunity to obtain much material with which to illustrate his text in an interesting manner. Descriptions of a large number of pathologic conditions of the oral tissues gives the book great value. The importance of the use of the toothbrush is strongly emphasized as it is made a part of the treatment for each condition, as well as an important factor in the prevention of these conditions. It is unique in that the use of the toothbrush is made such an important part of each chapter.

The text begins with an interesting history of the development of the toothbrush. The reader's interest is at once attracted, and, in the second chapter, it becomes fixed by the challenge that we are still groping about for agreement as to the etiology of dental caries and periodontal disease, as well as a practical procedure for the prevention of these diseases without the continual use of the toothbrush.

The use of the toothbrush for tissue stimulation in the treatment of many forms of gingivitis is discussed in the next six chapters. Five chapters are devoted to tissue trauma and tooth wear that may be caused or increased by improper use of the toothbrush. An extensive discussion of gingival tissue recession and erosion or wasting of the teeth is given and fully illustrated. Three chapters are devoted to methods of brushing the teeth advocated by different operators, and the proper type of brush for the most efficient use. Dentifrices and their various ingredients are discussed. The warning given against the too general use of sodium perborate dentifrices as a preventive of Vincent's infection is timely.

The excellent chapter on food impaction is a classic and adds greatly to the value of the text. The last chapter gives a review of the research on dental caries, and the brief summary includes dietary recommendations that are sound.

The text is well written and beautifully illustrated. There is an extensive bibliography and also a very complete index.

The book, the only one of its kind that has been written, is a valuable contribution to dental literature. It should be in every dentist's library.

E. D. C.

Books Received

Macleod's Physiology in Modern Medicine

Edited by Philip Bard, Professor of Physiology, Johns Hopkins University School of Medicine. With the collaboration of Henry C. Bazett, Professor of Physiology, University of Pennsylvania; George R. Cowgill, Associate Professor of Physiological Chemistry, Yale University School of Medicine; Harry Eagle, Past Assistant Surgeon, United States Public Health Service; Chalmers L. Gemmill, Associate in Physiology, Johns Hopkins University School of Medicine; Magnus I. Gregersen, Professor of Physiology, College of Physicians and Surgeons, Columbia University; Roy G. Hoskins, Director of Research, Memorial Foundation for Neuroendocrine Research; J. M. D. Olmsted, Professor of Physiology, University of California; Carl F. Schmidt, Professor of Pharmacology, University of Pennsylvania. Eighth edition. St. Louis: The C. V. Mosby Company. 1938. Price $8.50.

A Textbook of General Biology

By E. Grace White, Ph.D., Professor of Biology, Wilson College, Chambersburg, Pa. With 336 illustrations. Second revised edition. St. Louis: The C. V. Mosby Company. 1937. Price $3.00.

Wegweiser für eine neue klinische Zahn-Mund-und Kieferheilkunde

Ganzheitsbehandlung. (New Clinical Guide for Treatment of Diseases of the Teeth, Mouth and Jaws.) By Dr. Med. and Dr. med. dent. Otto Steiner. Germany: J. F. Lehmanns Verlag, Munich-Berlin, 1938. Pr. RM. 15.

Protesis a placa (Prosthetic Dentistry). Tomo 2.

By P. Saigar. Buenos Aires, Argentina: Progreso Dental, 1938.

Cottrell's Appointment Diary for 1939.

London: Cottrell & Company. Price 3/6 net.

ANNOUNCEMENTS

ANNOUNCEMENTS must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

CALENDAR OF MEETINGS

AMERICAN ACADEMY OF PERIODONTOLOGY, Milwaukee, Wis., July 13-15.

AMERICAN ACADEMY OF RESTORATIVE DENTISTRY, Milwaukee, Wis., July 15-16.

AMERICAN ASSOCIATION OF DENTAL EDITORS, Milwaukee, Wis., July 15.

AMERICAN ASSOCIATION OF PUBLIC HEALTH DENTISTS, Milwaukee, Wis., July 16-18.

AMERICAN COLLEGE OF DENTISTS, Milwaukee, Wis., July 16.

AMERICAN CONGRESS OF PHYSICAL THERAPY, New York City, September 5-8.

AMERICAN DENTAL ASSISTANTS ASSOCIATION, Milwaukee, Wis., July 17-21.

AMERICAN DENTAL ASSOCIATION, Milwaukee, Wis., July 17-21.

AMERICAN DENTAL SOCIETY OF EUROPE, Lausanne, Switzerland, August 7-9.

AMERICAN FULL DENTURE SOCIETY, Milwaukee, Wis., July 15-16.

AMERICAN SOCIETY OF ORAL SURGEONS AND EXODONTISTS, Milwaukee, Wis., July 14-15.

AMERICAN SOCIETY FOR PROMOTION OF DENTISTRY FOR CHILDREN, Milwaukee, Wis., July 17.

AMERICAN SOCIETY FOR THE ADVANCEMENT OF GENERAL ANESTHESIA IN DENTISTRY, New York City, fourth Monday in March and October.

ASSOCIATION OF AMERICAN WOMEN DENTISTS, Milwaukee, Wis., July 17-21.

CONGRESS OF AUSTRALIAN DENTAL ASSOCIATION, Melbourne, August 21-26.

DISTRICT OF COLUMBIA DENTAL SOCIETY, second and fourth Tuesdays in each month from October to June at the United States Public Health Service Auditorium, Washington.

EASTERN ONTARIO DENTAL ASSOCIATION, Ottawa, Canada, October 16-17.

FÉDÉRATION DENTAIRE INTERNATIONALE, Zurich, Switzerland, July 25-30.

GREAT LAKES ASSOCIATION OF ORTHODONTISTS, Dearborn, Mich., November 6-7.

INTERNATIONAL COLLEGE OF DENTISTS, U.S.A. SECTION, Milwaukee, Wis., July 16.

MONTREAL DENTAL CLUB ANNUAL FALL CLINIC, Montreal, Canada, September 27-29.

NATIONAL DENTAL ASSOCIATION, New York City, August 14-18.

STATE SOCIETIES

September

California State, at San Francisco

October

Southern California, at Los Angeles (15-20)

Hawaii, at Wailuku

November

Ohio, at Columbus

Puerto Rico, at Caguas City

February (1940)

Minnesota, at St. Paul (27-29)

April (1940)

Louisiana, at Monroe (18-20)

Texas, at Dallas (9-11)

May (1940)

Indiana, at Indianapolis (20-22)

STATE BOARDS OF DENTAL EXAMINERS

Delaware, July 12-14. Charles R. Jefferis, Medical Arts Bldg., Wilmington, Secretary.

Illinois, in Chicago, November 7-10. Homer J. Bird, Springfield, Superintendent of Registration.

INDIANA STATE DENTAL ASSOCIATION

THE next annual meeting of the Indiana State Dental Association will be held at the Claypool Hotel, Indianapolis, May 20-22, 1940.

E. E. EWBANK, *Secretary*,
Kingman.

TEXAS STATE DENTAL SOCIETY

THE next annual meeting of the Texas State Dental Society will be held in Dallas, April 9-11, 1940.

WILLARD OGLE, *Secretary,*
313 Medical Arts Bldg.,
Dallas.

DENTAL RESERVE OFFICERS OF THE NINTH NAVAL DISTRICT

A MEETING of the Dental Reserve Officers of the Ninth Naval District will be held at the U. S. Naval Training Station, Great Lakes, Ill., July 19. The officers will arrive at Great Lakes at 10:30 a. m., daylight saving time. The station will be toured, and luncheon will be served at 12 m. at the Officers' Club, with a talk by the commandant. At 3 p. m., a Dress Parade will be held, followed by Retreat and return to Milwaukee. All Naval Reserve Officers are invited to attend, as well as any members and guests that may be interested. It is requested that uniforms (service white) be worn if possible. Return to Milwaukee is timed to permit attendance at the dinner of the Dental Section of the Association of Military Surgeons of the United States that evening at the Schroeder Hotel. Facilities for registration and information will be available in the lobby of the Schroeder Hotel.

FREDERICK F. MOLT, Comdr.,
DC-V (S) USNR,
25 E. Washington St.,
Chicago, Ill.

EXAMINATION FOR APPOINTMENT IN THE DENTAL CORPS, REGULAR ARMY

AN examination for the selection of candidates for appointment in the Dental Corps, Regular Army, will be held August 7-12. The examination, which will include both physical and professional examinations, the latter consisting of written, oral and clinical tests, is open to male citizens of the United States between the ages of 22 6/12 and 31 9/12 years at the time of the examination, who are graduates of acceptable dental schools and who have had at least one year and eleven months subsequent practice in their profession. Candidates who have failed in more than one previous examination in the Dental Corps, Regular Army will not be permitted to take the examination again. Full information and application blanks will be furnished upon request to the Adjutant General, War Department, Washington, D. C. Applications will not be considered after July 22.

LAST CALL FOR PARTICIPATION IN THE RESEARCH COMMISSION'S COMPILATION ON DENTAL CARIES

SUMMARIES from 174 authors or groups of authors have been received for the compilation of data on the cause and control of dental caries. An index is about to be made and all parts of the manuscript will soon be prepared for immediate publication after the next Annual Session of the American Dental Association. We again invite all students of caries to contribute summaries of their findings and conclusions. Additional summaries received before July 15 can be included.

DANIEL F. LYNCH, *Secretary,*
Research Commission, A. D. A.,
2651 Sixteenth St., N.W.,
Washington, D. C.

UNIVERSITY OF BUFFALO DENTAL ALUMNI

THE thirty-ninth annual meeting of the University of Buffalo Dental Alumni Association will be held at the Statler Hotel, Buffalo, October 11-13.

TRACY M. BISSELL, *Chairman,*
Publicity Committee,
3311 Bailey Ave.,
Buffalo, N. Y.

WASHINGTON UNIVERSITY DENTAL ALUMNI ASSOCIATION

THE alumni of Washington University School of Dentistry will hold a luncheon in the Banquet Room of the Schroeder Hotel, Milwaukee, July 18, at 12:15 p.m.

LEO M. SHANLEY, *Secretary,*
7800 Maryland Ave.,
Clayton, Mo.

FORSYTH ALUMNI ASSOCIATION

THE annual meeting of the Forsyth Alumni Association will be held in Milwaukee at the Schroeder Hotel, July 18, at 6:30 p.m. Dinner will be followed by the business session.

ROBERT A. HARRIS, JR., *Chairman,*
529 University Club Bldg.,
St. Louis, Mo.

UPSILON ALPHA FRATERNITY, ETA CHAPTER

A FORMAL dinner will be given for the Eta Chapter of Upsilon Alpha Fraternity at The Surf, 1522 N. Prospect Ave., Milwaukee, July 18, at 6:30 p. m. For reservations, address Miss Frances Kalosh, 1018 S. 44th St., or Marquette University Dental School.

PSI OMEGA FRATERNITY

PSI OMEGA headquarters during the meeting of the American Dental Association at Milwaukee, July 17-21, will be the Milwaukee Athletic Club. All visiting brothers are requested to register on arrival. The annual banquet of the National Alumni Chapter will be held at the Milwaukee Athletic Club, July 17, at 6:30 p.m. All Psi Omegas and their wives or woman guests will be welcome. The executive meeting of the national alumni chapter will be held in the headquarters room, the exact date and hour to be announced later. Delbert P. Nachazel (Xi 1928) is chairman of the Local Arrangements Committee.

J. THOMAS CONNER, *Grand Master*,
Atlanta, Ga.

SIGMA EPSILON DELTA FRATERNITY

MEMBERS attending the annual meeting of the A. D. A. in Milwaukee, July 17-21, are requested to register at the desk for a fraternity "get-together."

AMERICAN CONGRESS OF PHYSICAL THERAPY

THE eighteenth annual scientific and clinical session of the American Congress of Physical Therapy will be held September 5-8 at the Hotel Pennsylvania, New York City. Before these sessions, the Congress will conduct an intensive instruction seminar in physical therapy for physicians and technicians, August 30-September 2.

A. R. HOLLENDER, *Executive Director*,
30 N. Michigan Ave.,
Chicago, Ill.

AMERICAN DENTAL SOCIETY OF EUROPE

THE next annual meeting of the American Dental Society of Europe will be held in Lausanne, Switzerland, August 7-9, 1939.

K. C. CAMPBELL, *Secretary*,
88 Portland Place,
London, W. 1.

AMERICAN ASSOCIATION OF DENTAL EDITORS

The American Association of Dental Editors will hold its annual meeting, Saturday, July 15, 1939, in the Hotel Schroeder, Milwaukee, Wis. It will be an all day meeting and editors are urged to attend.

O. W. BRANDHORST, *Secretary*,
4500 Olive St.,
St. Louis, Mo.

AMERICAN COLLEGE OF DENTISTS

The American College of Dentists will hold its annual convocation, Sunday, July 16, 1939, in the Crystal Ballroom, Hotel Schroeder, Milwaukee, Wis. The Fellows of the College are urged to attend.

O. W. BRANDHORST, *Secretary*,
4500 Olive St.,
St. Louis, Mo.

TENTH AUSTRALIAN CONGRESS MELBOURNE, AUGUST 1939

APPROXIMATELY 600 members are expected to attend the Congress of the Australian Dental Association in Melbourne in August. In proportion to the population of Australia, this figure compares not unfavorably with similar gatherings in Europe and America.

A warm welcome will be offered to those who at great expense and sacrifice of time come to the Congress from overseas. Their visit will forge another link with the profession in the countries from which they come, and the inspiration of their presence will not fade when they leave Australian shores.

August 21-26, 1939, will set a milestone in the progress of Dentistry in Australia, as every phase of dental science and art will be reviewed and discussed.

W. A. MORRISON, D.D.S., *Chairman*,
Publicity Committee,
193 Spring Street.,
Melbourne, Australia.

MONTREAL DENTAL CLUB FALL CLINIC

FOLLOWING is the program of the Fifteenth Annual Fall Clinic under the auspices of the Montreal Dental Club to be held at the Mount Royal Hotel, September 27-29:

"Essentials of Radiodontic Service."
Clarence O. Simpson, M.D.,
D.D.S. . . . . St. Louis, Mo.

"Minor Oral Surgery."
Don E. Woodard, D.D.S., M.S.D.....Kansas City, Mo.
"Inlay Bridgework, Porcelain Jackets."
Carlisle C. Bastian, D.D.S.....New York City
"Periodontia."
G. R. Lundquist, M.S., D.D.S.....Chicago, Ill.
"Analgesia."
Walter V. McGilvra, D.D.S.....Worcester, Mass.
"Economics and Practice Management."
Gaylord J. James, D.D.S.....Cleveland, Ohio
"Responsibility of Dentist and Orthodontist."
Lowrie T. Porter, D.D.S.....New York City

Table clinics: A series of twelve clinics by members of the Ottawa Dental Society.

Registered clinics: Drs. Simpson, Bastian and Woodard will each conduct a clinic from 4 to 6 p.m., September 27, 28 and 29. The registration fee for the three clinics will be $10 and membership will be limited to seventy-five.

Fall clinic membership fee, including two luncheons: resident, $10; nonresident, $5.00.

For preliminary program (ready about August 15), communicate with

F. A. Edward,
Medical Arts Bldg.,
Montreal, Quebec.

YOUNG MEN OFFERED FREE SUMMER COURSE ON TRAINING SHIP

The American Nautical Academy, National Training School for Merchant Marine Officers, Washington, D. C., has announced that boys and young men between the ages of 11 and 21 years will be allowed to secure practical ship experience on board a training ship of the Academy within the period from June 1 to October 1, 1939.

The young men may remain on board ship for the entire period, or for any shorter time they may wish, but not for less than a month. Students who enter for any period less than the full course will receive instruction only in those subjects being taught while the student is on board ship.

The course is intended (1) as a foundation for those who wish to become officers in the Merchant Marine, and devote their lives to a career in the service, and (2) for those boys and young men who, though not desirous of following the sea, wish to obtain a general knowledge of ships, and the life afloat.

There is no charge for instruction nor for the living quarters on board ship. The only required expense is for meals, which are 49 cents. Three meals are served daily.

There is no tuition charge for any of the courses offered by the Academy, and no obligation for future merchant marine, military or naval service of any kind is incurred by the young men.

The school ship to which the young men will be assigned is the training ship *Marsala*, a vessel of 2,422 tons, 284 feet long and 45 feet broad, built in 1919-1920.

On Sundays, the cadets will be allowed to attend divine services at the churches of their respective denominations on shore. While on board ship, cadets will receive free minor first aid treatment when necessary.

This, the tenth annual summer course offered by the academy, will be under the personal supervision of the captain commandant of the academy, who will be in command of the vessel.

While on board ship, the students will follow the regular daily ship routine, and will be given practical instruction in nautical subjects, including seamanship (ship's work), signaling, rowing and handling, the use of motor boats and pulling boats, lifesaving and naval drills. Many of the duties on board ship are performed by the cadets as part of their training. They will also receive instruction in the use of life buoys, first aid, the compass, log, lead and ground tackle and the duties of lookouts, as well as the duties of the watch on deck.

Students will join the training ship at Virginia where the vessel will be based at Hampton Roads for the summer training period.

Those completing the summer course with a passing grade will be eligible to apply for a scholarship in the navigation course.

Owing to the fact that the number of accommodations available is limited, those wishing to take advantage of this opportunity should write at once to the

American Nautical Academy,
National Training School for
Merchant Marine Officers,
Washington, D. C.

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